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TRUTH IN PUBLICITY.

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THE modern world believes in education. The adult citizen as well as the child needs instruction. People are trusting less to legislation and more to education. Organizations as diverse as the New York Central railway and the American Social Hygiene Association are conducting campaigns of publicity. With this educational movement I am in hearty accord. It would appear almost an axiom that the teacher should teach the truth. Yet there are many to whom this does not seem to have occurred. If the tares of error are sown among the wheat they are sure to spring up and many a summer sun will come and go before they wither and die. Science is merely truth systemized. Though a distinguished sanitarian has told us that sanitary science should be tempered by common sense, it was spoken in jest. It is not real science but only the pseudo-science of the amateur which needs to be, not tempered, but thrown out root and branch.

In the past, many errors have been taught by alleged sanitarians and enthusiastic reformers of many kinds. Some of these errors are still entrenched in the minds of the public to plague us and hinder progress. Errors often did, and do, masquerade in the name of science, but they are not her offspring.

In the early days of public health work we copied the errors of our European teachers and added to them. There was little real science. Untested theory, or often pure fantasy, dictated sanitary procedure. Let us turn to the teachings of the seventies and eighties of the last century. The environment was then the field for sanitary effort, not the person. Out of about 800 pages of Parkes' Hygiene, only 27 are devoted to the contagious diseases proper. The soil was in those days thought to be a common source of disease. The foul emanations from the decomposing organic matter were sucked up from cellars by the warm air of the house and carried sickness and death, ergo, if one would live, make the cellars impervious with asphalt. One state official writes,

"There can be no doubt that the ground-air under the village of ———

is seriously contaminated with general filth and specific enteric poison, and that this is liable to pass into any or every house in the village, carrying the seeds of disease with it. The ground air is not only drawn into houses by heat, but with every rise of the sub-soil water it is forcibly expelled from the ground into the houses and the streets. This air comes loaded with polluted moisture and may be either the cause of typhoidal or malarial fevers, or of dysenteries, diarrhœas and consumption."

The supposed danger from cemeteries is well illustrated by answers to an inquiry for opinions sent out to sanitarians. One writes:

"If one thing in sanitary science is better settled than another it is that decomposing human bodies pollute both the air above the ground, the ground itself, and the water that percolates through the ground. Polluted air and poisoned water are certainly detrimental to public health."

Another says:

"I do regard the presence of a cemetery, either large or small, in a city, as detrimental—yea, very dangerous—to the public health. I think poison enough may be derived from one human body to contaminate the well water and the air for a long distance under favorable circumstances for its diffusion. I should hesitate much to drink or use the water from a well situated one-half mile from a cemetery, if the intervening soil was gravelly or sandy, unless said water had recently been subjected to a searching chemical examination."

Filth, we were told, was the principal source of disease. In it bred hypothetical germs, or from it arose still more hypothetical gases. The pig pen, the garbage bucket, the trash pile, the manure heap and the privy vault were equally dangerous. How exasperating to us, who appreciate the evidence that only certain kinds of dirt are dangerous, is the persistent error that all dirt is dangerous. Belief in the supreme importance of dirt as a cause of disease persisted long and at the close of the Spanish war Colonel Waring was sent to clean the city of Havana and so exterminate yellow fever. He did clean it but the fever was more virulent than ever and only the real science of Reid and its brilliant application by Gorgas conquered this pest of our tropics. Even the less obtrusive forms of dirt were dangerous. Listen to what one writer says.

"A prominent physician reports the occurrence in the northern part of the state, of twenty-seven cases of severe typhoid fever, some of them fatal, the direct result of the unhealthy influences of a damp and uncleanly cellar."

"To prevent the emission of ground, air or soil moisture from the cellar bottom or sides, the sides must be laid in good hydraulic or asphaltic cement, and the bottom in the same, or in alternate layers of asphaltic cement and felt saturated with bitumen."

"Disease is also sometimes caused by half cleaned or neglected cupboards, closets, pantries, or provision rooms, where bits and crumbs are left to decay."

"It is not necessary, however, that contaminated water, or the effluvia of surface or pooled filth, or uncleanly

cellars or pantries, should be sufficiently poisonous, to produce directly and obviously the common diseases of summer, to be sources of danger; for other derangements of the human economy, varying with the constitutional peculiarities of individuals, may be as easily induced by the same causes; and in absence of any or all acute diseases, it is quite probable that very many of the obscure ailments of numerous persons, not immediately dangerous, have the same origin, and are consequently so perpetuated; making the victim's life almost intolerable with aches and pains, and functional disturbances of the nervous system, the stomach, bowels, kidneys and other organs almost endless."

"The great, the indispensable remedy is cleanliness, and not only of inanimate but of animate bodies also, for filth is the same disease-producing agent, whether upon the surface of the earth, or in or about the habitations of man, or incrusted upon the surface of human bodies."

A dead human body was long considered a great menace. Dead from contagious disease it might cause an outbreak. This theory gave rise to burdensome restrictions as to transportation and funerals which no one, now that we have taken pains to study the subject, would ever think of enacting. The mind of the sanitarian was obsessed with the idea that dead things are more dangerous because of contagion than are the living, hence the fear of fomites and the worship of disinfection, though no one seems to have made even an effort to find out whether disinfection is really necessary.

Air was the chief vehicle of infection, nay, it was infection itself. The emanations from cellars and untidy cupboards which dealt death and destruction through the house have been referred to, as well as the more specific effluvia which gave rise to yellow fever, consumption and diphtheria. Conditions became even more terrible when evidence began to accumulate that living germs, not gases, were the cause of infectious diseases. Listen to what was taught in 1878 in my own state.

"These germs, by their exceeding lightness, may separate from any of the emanations from the body, either after having been thrown out upon the surface of the ground, and rising therefrom to be wafted away in the currents of the air, to infect some other person or persons, weeks or months afterwards, and the scores of miles away, or, separating immediately in the sick chamber from the breath, perspiration, scaling off, or other discharge from the body, may rise and floating about in the room, infect some unwary caller, to find lodgment in some nook or crevice, or on some shelf, moulding, sash, ornaments, curtain, drapery or other clothing, to be again dislodged from their resting places, weeks, months or years afterwards, to affect some casual visitor or new occupant, or be carried away in articles of furniture, ornaments or wearing apparel, to spread infection and carry dismay to other persons, and in other localities."

There is little wonder that, when a few years ago we sought to establish a hospital for contagious disease, the neighbors rose as one man to protest

against the outrage. Scores of them now spend their Sunday afternoons in our pleasant grounds.

The discovery of vaccination against smallpox was a fine piece of scientific work but it was sadly marred by an assumption entirely unwarranted, that when performed in infancy it will protect through life. After a time this was found not to be true but this mistake more than anything else developed and kept alive the propaganda of the anti-vaccinationist. The opprobrium of our art is that preventive medicine, like its other branches, has taught much that has had to be unlearned. We ought not to be surprised that the people do not believe all we say, and often fail to take us seriously. If their memories were better they would trust us even less.

The methods of science when applied to the problems of life rarely discover the exact truth and the whole truth. Scientific knowledge is a growing plant. New leaves are continuously budding from the old. Rarely does it need pruning and its solid branches shall never be cut away. Jenner proved beyond question the protective power of vaccination, a truth which will always stand, but it remained for others to determine how universal is this immunity and how long it persists and countless other secondary truths of great importance, which have been, and are, being added to the original truth. It was only the hasty assumption of the hasty philanthropist which had to be un-learned. In our own time, too, the amateur sanitarian and the social reformer and even the public health official are impatient of the slow progress of science and, taking the short and easy road which is paved with guesswork theories and unfounded assumptions, and which leadeth to destruction, they hasten to spread error before the people, which will later hamper the health officer as does now the assumption of Jenner as to the duration of vaccinia immunity, or does the theory of air-borne infection. Let us see what our health officers are teaching today. Are we doing any better than our forbears?

The old heresy about the all importance of dirt, any kind of dirt, in the causation of disease, still persists. If the writers for the weekly or monthly bulletin cannot think of anything else they can always fall back on a new sermon on dirt. Of course we all know that all human excretions are potential of danger and everything which contains our excretions or is smeared with our fresh secretions must be avoided. We know, too, that flies breed in certain kinds of dirt. It is doubtless true, too, that whatever in a general way encourages cleanliness tends to discourage those habits which favor infection. To fight all kinds of dirt instead of limiting attacks to dangerous dirt is misleading and futile. You smiled at the ancient Rhode Island essay on the relation of dirty cupboards to intolerable stomach-ache but is it not as bad to print,

DIRT IS Disgusting
Disfiguring
Devitalizing
-e-a-d-l-y

"The dirt-rate of a city is a big factor in determining its death-rate."

"A vigorous anti-dirt campaign

would do the city more good than any other kind of an 'anti' campaign of which we are able to conceive—more good morally, physically, healthfully and eventually with respect to its reputation." Another:

"To clean up the city means to clean out disease."

"Indifference about dirt produces high death-rates from preventable disease."

"Conspicuousness for habits of cleanliness means conspicuousness for good health and a low death-rate."

A picture bulletin shows adjoining yards, one shiftless and dirty, the other lovely with flowers, with the mottoes, "Dirt and disease go hand in hand." "Clean up for health's sake."

The public will thus believe that, when the streets are swept, the rubbish removed from the cellar and yard, the garbage cremated instead of dumped, and the spring housecleaning done, the city's death-rate will be lowered. When they find it is not, they will not believe the next issue of the bulletin which tells them that antitoxin cures diphtheria.

A poster shows "Household weapons against dirt and disease," a broom, shovel, rake, scrub brush, wash tub, bath tub and set basin and other things. The legend runs, "The main line of defense against dirt and disease lies in the home." Are we expected to shovel up bacilli and sweep out spirochetes? Will the wash boiler prevent the baby from catching whooping cough or measles? The bath tub is inscribed the "cradle of cleanliness." "Bathe often and give the pores a chance to breathe." Here is either a remarkable use of the English language or a remarkable physiological discovery. It will not be disputed, I think, when I say that there is not a bit of evidence to show that it makes the slightest difference to our health (except for the tonic effect of a cold bath) whether we get into a tub once a day or once in three months. The individual drinking glass, the individual towel, and running water for washing the hands, are necessary to prevent infection, but they found no place in this picture bulletin. May we not safely infer that the artist was not a thinking animal?

A recent bulletin has a picture of a crowded lodging house dormitory with the subscription "A breeding place for germs." Pretty discouraging, is it not, for those of us who have been trying to eradicate the superstition of bygone ages?

Another form of dirt which appeals to the publicity man is dust. Now, there is one kind of dust which is dangerous, that is sharp mineral dust, but that is not dirty dust. It is the dust of the street and the home that is attacked in the monthly bulletin. A cartoon shows the dust of the street falling on fruit, candy and ice-cream and a little boy in the throes of stomach-ache presumably caused by eating thereof. No evidence has yet been adduced to show that disease ever is spread in this way and much has been adduced to show that it is not. But under the influence of this campaign of publicity, some communities, which feel too poor to furnish free antitoxin, are spending money to keep dust off the ice-cream and bananas. An

other bulletin says, "Avoid home dust." It "often causes disease." The fact is that there is so little evidence that street dust and house dust, except perhaps near careless consumptives, is dangerous, that the less we say about the matter the better.

So, too, in the present state of our knowledge of the relation of the air to disease, knowing that the old theory of exhaled poisons has been demolished, that germs rarely float in the air, that we are still in profound ignorance as to the relation of humidity to disease, that most of the supposed effects of foul unventilated rooms have been shown to be due to temperature and odors, is it not better, when our best students of the subject have little to offer but surmises, to refrain from such teaching as,

"Ventilate, you Lobster! Ventilate!"

"Pure air is the best life insurance."

"Get good air and you will get good health."

Another says,

"No one would think of drinking water that had been used for bathing purposes, but many of them go on breathing over and over again air that has been breathed by themselves and other people; air that is literally saturated with the effete products of respiration, emanations from the skin and filth carried on clothing and in foul mouths."

"People have been educated to refuse to eat from tableware that has not been properly cleansed, but offer no objection to a second-hand atmosphere for breathing purposes."

"They will keep their skin clean with soap and water and then pollute their respiratory tract with a polluted atmosphere."

"Many of these deaths are closely akin to suicide; many others are closely akin to murder. How much longer shall the slaughter go on? Radical changes have been made in the street cars and some of the theatres. Much remains to be done."

"Some of the hotel banquet halls are incubators for grippe, pneumonia and consumption."

All of this is absolutely misleading.

A cartoon shows "Blithesome Mrs. Foul-Air and her Deadly Offspring—several cheerful skeletons labeled "Tuberculosis, Pneumonia, Influenza, Bronchitis, and Colds" and another editor names la grippe, sore throat, catarrh, colds, bronchitis, pneumonia and tuberculosis as due to lack of ventilation. "You can't see," he says, "the insidious enemy that lurks in the fetid atmosphere."

"Not even contaminated water is more dangerous to the human system than the air that is breathed over and over until its life-sustaining properties have been replaced by foul poisons given off by the human system."

While some men are striving to learn the truth, and solve by scientific methods the difficult problems of disease causation, the publicity man, as blithesome as mistress "Foul-Air," spreads broadcast pestilential errors which date back a half a century or more.

While we feel quite certain that the pneumococcus is the chief causative agent of pneumonia, pathologists and epidemiologists are still uncertain as to the relation of all the causative fac-

tors. The carrier, partial immunity, auto-infection, contagion predisposing causes, routes of infection, strains of varying virulence, offer countless problems still unsolved. No one knows just how pneumonia is caused—except the publicity man. He says,

"Pneumonia is a dirty house disease; it is developed in illy-ventilated houses, not in the pure air of out-doors as many people believe. You can't contract pneumonia in pure air; you can very easily contract it in impure air."

Another,

"Be careless about the air you breathe and you stand a good chance of being numbered among the 3,000 citizens who, in all likelihood, will fill pneumonia graves within the next five months."

Still another,

"From now until about the middle of April the pneumococcus will get in its deadly work. It flourishes in bad air, whether in workshop, factory, store, school room, home, or street car. The air of a closed house is foul, stagnant and disease breeding."

Again,

"One of the prominent men of the country died several weeks ago of pneumonia. A day or two before his illness developed he attended a banquet, and was exposed to an overheated, close, polluted atmosphere. Two prominent citizens attended the same banquet and were made ill, but escaped pneumonia. One was 'laid up' for ten days, the other for two weeks."

Our food, by the popular writer, has always been considered a source of great danger, and to attack adulterations is to receive the plaudits of the multitude. A city which boasts of having recently put its health department on a scientific basis publishes:

"Pure food is as important to health as pure air. The authorities, to whom is committed the duty of protecting public health, have a serious responsibility to discharge at this point. They must rigidly enforce the laws against the sale and offering for sale of decayed and decaying food products, without fear or favor. This we propose to do, but we are charged with destroying some food that is salable at cheap prices. Cheap food may be, and often is, the most expensive food to buy. The poor must be protected against so-called cheap food, which may be partially decayed and dangerous to health. It never pays to run any risk in the food supply of a city. Our slogan is—"Pure food for ———."

A cartoon shows death pouring adulterants into soups and sardines while a lovely red cross nurse, labeled "health," is dealing out cans marked P–U–R–E. The truth is that adulteration, except in a few instances, is an economic, not a health problem. As to partially decayed foods we know nothing about their relation to health. While inspection may be demanded on esthetic grounds there is no evidence to show that inspection prevents disease. The clean handling of foods is most desirable from a sanitary standpoint but real cleanliness is most difficult of attainment. Much that appears is carelessly written and the emphasis is placed on the wrong thing, as when dust absorbs all the attention

and nothing is said about dirty hands. Exaggeration has its way as when we are told that "Dirty ice-cream is a big factor in summer diseases." It is safe to say that the writer neither knows nor cares whether this is true or not.

Some remarkable physiological principles are at times published.

"Lost—One perfectly good pair of kidneys somewhere between Comfort Street and Affluence Boulevard stations on the Road to Wealth. Will gladly pay all my millions for their return.—Mr. I. M. Sorry-Now, 13 Experience Place."

Is it not a comfort to know that the etiology of chronic nephritis has been so well worked out?

Here, too, is news about immunity. If true we may as well give up our vaccine laboratories.

"When we lead a healthy normal life, breathing good air, exercising enough to make a keen blood circulation, eliminating properly and eating our food with a zest, we are at a high point of immunity. Then it is that certain substances within the body make charges against the poisons or toxins and also kill the germs that are responsible for the toxins."

While I have questioned some of the allegations which have been made against the house-fly as a bearer of disease, I am perfectly willing to admit that he does at times and in places become a factor of importance in the spread of fecal-borne diseases. He is also a very dirty and disgusting insect. This is enough. Why call the fly "deadlier than the tiger or cobra" or "the most dangerous animal in the world." It is news to most of us that "Napoleon could not retain his hold on Egypt because of the fly," and "that many diseases of obscure origin doubtless were caused by fly contamination." The same bulletin says that,

"An eminent medical authority has recently figured out that the fly as a carrier of the germs of typhoid fever annually costs the people of the United States for sickness, medical expenses, lost time and funeral expenses the enormous sum of three hundred and fifty millions of dollars!"

We ought to make this accurate mathematical gentleman chairman of our section on vital statistics.

The following, while interesting reading, is somewhat misleading in its etiology.

The Fly.

"He has his birth in the manure, crawls forth and loiters in the sewer, and, smeared with deadly typhoid germs, he leaves his brother maggot-worms, unfurls his dainty wings of silk and dumps his microbes in the milk, where their huge numbers mount and mount, increasing the bacterial count, until they reach the food supply some woman feeds her 'baby-bye.' The fly comes gaily unto us, his feet all gummed with poison-pus, and, singing clear his song so sweet, alights and cleans them on the meat. He gathers scarlet fever spores and leaves them on the walls and floors: he is not proud, and oft will stoop to carry heavy loads of croup, and place it where its awful death may come and go with baby's breath. Oh, do not call him indolent! He calls that summer day misspent in which he fails to load the breeze with

the live germs of some disease; and if he finds them not, though hurt, he'll be content with just plain dirt."

We would all like to get rid of the fly but do we really know any practical way of doing it? Is there a flyless city? The bulletins are free with advice, but how good is it? One cartoon purporting to show "How typhoid flies are made" gives mutton chops as their only breeding place. The chief emphasis is usually laid on swatting the fly. This must be practised on the hibernating insect. To kill one is to kill 350,000,000. Prizes for dead flies, fly traps, poison, and all sorts of schemes for handling stable manure are taught us over and over again in infinite variety. Why not wait until some one finds out whether they will work before telling the people that they will work.

One great trouble with the publicity man is an inordinate desire to get in on the ground floor. When he hears something new he tells it without waiting to learn whether it is true. Untried schemes of all kinds are put forward as confidently as if they were as sure as vaccination. It is not so very long ago that the sanatorium was preached as the most important factor in fighting tuberculosis while now many specialists think quite otherwise. Many prophesied the speedy eradication of the disease and not a few fixed the year as 1915. Great speed will be required to finish the last lap. Let us take warning and ever bear in mind that only an exact science can forecast the future. Within a few years various plans of excreta disposal for the rural districts have been published in health bulletins as solving the problem. The editors could not wait to try them. Now they have all proved disappointing and of far from general application. I was recently shown a scheme for the disposal of house drainage about to be published by a state board of health, and when I asked if it had proved satisfactory was told that it had not as yet been tried. Better be the last city to publish a useful sanitary measure than be the first to teach one that later proves a failure.

Many other remarkable things about disease we learn from the weekly bulletins. Thus we read,

"One of our school teachers whose little brothers had died of croup contracted from wet feet some years before, very carefully inspected the little tots in her room for wet feet and found quite a number."

We have plenty of arguments for preserving the teeth without making such a statement as "The use of alcohol to excess does not cause as much disease as neglected teeth." The prohibitionists might well demand the proof.

One bulletin unique in its scientific accuracy yet makes the slip that,

"Every cold in the head . . . comes from a transfer of excreta." Unfortunately we know very little about the group of afflictions called colds and I am not aware that a single type has been definitely proved to be caused by a specific bacterium. On the other hand we do know that one important kind is produced by the pollen of plants and is not contagious.

Probably there are few here who agree with me entirely as to the value

of terminal disinfection, but I am sure there are fewer still who would assent to the following recent publication.

"Properly and efficiently done, fumigation is a great factor in the prevention of contagious diseases. It is the only means of checking its spread. A number of cities have spent thousands of dollars to stamp out epidemics in this manner. In fact, it is the only way in which this can be accomplished."

Another bulletin, after recommending the burning of a pound of sulphur in each room at spring housecleaning time, says this is, "a simple method of home disinfection that is most thorough and far-reaching in its results as regards disease prevention." . . .

"This simple method is given in the belief that every housekeeper will use it to the extent that all sleeping apartments, closets where clothes are kept, and such other rooms as required fumigation at house cleaning time will be fumigated in this manner to prevent contagious and infectious diseases from entering the home."

Doubtless there are some who will think all this hypercriticism. The slips are small, they say, and seldom occur. It is true that one may scour many pages of some publications without finding anything to offend, but others show them in nearly every issue. Some, perhaps, are of little moment but who would be so rash as to say that because a lie is a little one it can do no harm. As no one can follow the flight of an arrow, so the poet tells us, or know into whose heart the spoken word shall sink, so no one knows whose mind will be confused by the error which carelessly flows from our pens. One cannot expect scientific accuracy in publicity, a very good friend, who is a forceful writer of telling articles, said to me. I made no decided answer then, but the more I think of it, the more decided I am, that scientific accuracy should be insisted on. Our science itself is so inexact that we cannot afford to swerve one hair's breadth from it. One can hold steadfast to scientific truth and yet avoid, absolutely, all pedantry and scientific jargon. Clear, forceful and catchy writing is worse than useless if it fails to teach the truth and the truth only. So far as it departs from this our health literature approaches that of the fake medicine factory—and perhaps does more harm. The space writer is the curse of our day and generation and especially in our business.

For the sake of those who come after, stop filling your columns with tommy-rot, hot air and dope. Do not be always seeking novelty. Most that is new is bad. There are plenty of old truths which all of our 100,000,000 people have not yet learned. If you have nothing to write do not write it. Remember that bulletins were made for man and not man for bulletins.

Better pay your publicity man for doing nothing than for writing something which is not so. Careless writing betokens the lazy writer. Seek diligently the truth and faithfully publish it.

JUDICIAL ENFORCEMENT OF HEALTH PROTECTION.

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ONE whose position has brought him into close relationship with both the legal and medical professions for many years recently wrote: "The legal point of view is sometimes hard for physicians to attain, and by not doing so they frequently injure their case." This is well illustrated by the following incident.

Soon after the publication of my "Legal Principles of Public Health Administration" I was calling in the laboratory of a food chemist who has had considerable experience. He remarked: "It is disheartening to see how, after the most careful work on our part, cases are knocked out in the court on little unimportant technicalities." He was at that time testing some meat for chemical preservatives. He told me that he expected to prosecute the dealer. Note the extreme weakness of his case, which he thought strong because he found so much of the chemical. He was "too smart to put the market man on his guard by buying the Hamburger himself." He sent a boy in. He employed for this purpose a boy twelve years old, though the state law absolutely prohibited the employment of boys under fourteen. When the boy brought out a package from a store the official took it and marked it, but the boy could not identify the package later. He had no part in marking it, and the package was not sealed. At the laboratory a portion from each package was taken for test, and the remainder, instead of being sealed and preserved as evidence, was thrown away. At the best, here was a one-man chain of evidence. The market man had promised not to use preservatives. Both he and his clerk would probably swear that they had neither used it themselves nor seen others use it. This would be two against one.

It seems fitting, therefore, that the methods used in health administration should be briefly considered.

CHOICE OF ACTION.

The idea of *nuisance* is at the base of all public health protection. This implies that the thing or condition under consideration tends to work an injury to the community. If it work an injury to the community it must necessarily injure private parties. The object of legal measures is to prevent future injury. This may be accomplished by checking the nuisance before it has actually occurred, or by imposing a penalty for its past operation, and as a warning against future harm. It may be checked by injunction. A board of health is not obliged to wait until a nuisance has actually occurred before enjoining the location of a livery stable.[1] In fact, the fact of establishment might be an obstruction against future abatement.

[1] *Board of Health* v. *Tupper*, 96 N. E. 1096; 210 Mass. 378.

This application for an injunction may be made by the official guardians of the public weal, or by private individuals who may be injured by the proposed erection or establishment.

Secondly, the community may enforce its demands by civil suit. Many ordinances and statutes provide for the recovery of certain fines from those proven guilty of violating the requirements. The state or city sue for the recovery of the penalty. In such cases the amount to be demanded is fixed by legislation. It is a debt due to the community; and sometimes the violator of the law estimates in a cool business way that he may make money by violating the law, pleading guilty, and paying his fine. In other words, he figures the fine in with the other costs of his transaction.

Thirdly, the community may bring action *en tort* against the offender for all injury to the community as such which has actually been produced. Action *en tort* is limited to actual damage which has already occurred. The maintenance of a fly-breeding manure pit may threaten great danger to the community, though no great injury may actually occur. The public weal demands that the nuisance be abated before harm has resulted. This cannot be accomplished by action *en tort*. This should be attacked through criminal prosecution. On the ground of injury actually done, it may seldom be advisable for the community, to bring action *en tort*, for of necessity the injury actually done must fall more heavily upon some individuals than upon others. Each of these individuals has a valid claim against the offending party, and justice demands that he should personally be permitted to recover for damages sustained. Since the whole is greater than any part, it practically follows that damages recovered by the community would include damages of individuals, and the private citizens would therefore practically be estopped from action. Ordinarily this restriction would not apply to cases under the second classification, where the community sues to recover a penalty under the statutory provisions. These cases, though civil in form, are essentially criminal. Therefore, one who has borne in full the criminal penalty cannot show this fact in a civil action, either as a bar, or ordinarily in mitigation of damages.[2] However, in a case where the plaintiff in a civil suit had received a portion of the fine imposed in a criminal action, the presiding judge very properly directed that no more than nominal damages of one farthing should be allowed, and he reprimanded the attorney for undertaking the case.[3]

Fourthly, in a majority of the cases recourse is had to criminal prosecution either under the provisions of general statutes, municipal ordinances, or common law principles.

Criminal prosecution may be begun either by indictment or information, according to local laws, generally by indictment. As a general proposition, an indictment will not lie for an injury

[2] *Jefferson* v. *Adams*, 4 Harring (Del.) 321; *Wheatley* v. *Thorn*, 23 Miss. 62; *Storey* v. *Hammond*, 4 Ohio, 376; *Wilson* v. *Middleton*, 2 Cal. 54; *Ransom* v. *Christian*, 56 Ga. 351.

[3] *Jacks* v. *Bell*, 3 Car. & P. 316; See also *Puert* v. *Seiler*, 23 Pa. 424.

to only one or two persons.[4] If a nuisance affects the public generally it is indictable; if only individuals, it is actionable.[5] It is not necessary that the thing complained of has actually worked injury to the entire community, but it must be of such a nature to do so in order to be indictable. It is not sufficient to show that divers citizens have thus been injured.[6] For this reason a thing might be indictable in a crowded community, which would be only actionable in a less densely populated section. Where a nuisance can affect only a few persons, the residents of three houses,[7] for example, it has been held that it is not indictable.[8]

In the light of the foregoing, considering that flies travel only a few hundred feet ordinarily, and that rats would be easily seen and destroyed in making a long trip in the open, a manure pile which might properly be considered a public nuisance in town, and its owner therefore indictable, would at the most be only a private nuisance and actionable in a more thinly settled section. However, if located near a milk bottling plant, where it would endanger the health of a community, it should be considered public and indictable. So a pond breeding only culex mosquitoes in a northern community might be considered only actionable. If it bred anopheline mosquitoes in the outskirts of a town, or near a much frequented highway, it should be considered public and indictable, especially in the presence of malaria in the community. It is possible that it might be considered as private, and only actionable, if the pond be located in a retired spot to which persons might voluntarily resort, as for picnics.[9]

The fact that the statutes provide criminal remedies will not prevent a board of health, or a health officer, in proper cases, from having recourse to civil proceeding or injunction in order to suppress a public nuisance.[10] It is proper for the officer to enjoin the manufacture of food under such conditions as render its use dangerous to the public.[11] Though abatement of the nuisance is ordinarily the sole object of prosecution or action on the part of the community through its officers, abatement is not necessarily a part of the judgment, nor strictly in punishment.[12] Though a voluntary abatement on the part of the defendant may be properly considered by the judge in determining the sentence, still it may not necessarily lighten the penalty.

The state and a private individual may severally and simultaneously carry on, the one a criminal prosecution, and the other a civil suit, for the same wrong if both have suffered from it.

[4] *State* v. *Schlottman*, 52 Mo. 164.

[5] Bishop, Crim. Law, 8th ed. 236, citing *Rex* v. *Trafford*, 1 B. & Ad. 874.

[6] *Commonwealth* v. *Smith*, 6 Cush. 80; *Commonwealth* v. *Faris*, 5 Rand. 691.

[7] *Rex* v. *Lloyd* 4, Esp. 200.

[8] *Rex* v. *Hornsey*, 1 Rol. 406; *Moses* v. *State*, 58 Ind. 185; *Phillips* v. *State*, 7 Baxter, 151; Bishop, Crim. Law, 243, 244.

[9] See Bishop, Crim. Law, 244, 1.

[10] *Board of Health* v. *Maginnis Cotton Mills*, 46 La. Ann. 806.

[11] *Board of Health* v. *Susslin*, 132 La. Ann. 569, 61 So. 661.

[12] Bishop, Crim. Law, 8th ed. 1079.

With certain exceptions, neither will be affected by this double action.[13]

Sometimes the criminal action by the community bears a very intimate relationship to the civil action by the private party injured. Since the facts of the two cases are essentially identical in certain features, a plea of guilty in an indictment may very properly be produced against the defendant in a civil suit referring to the same act.[14] On the other hand, a plaintiff in a civil suit does not stand on "fair ground" unless he shall have first discharged his public duty by aiding in the prosecution for the public wrong.[15] The citizen owes a duty to the state, and when he comes as a plaintiff in a civil suit he must show that he has performed his duty as a citizen by doing his part towards bringing the defendant to justice. Conversely, the public officer should render such aid as he reasonably may in private suits of this nature. It sometimes happens that the only efficient means for suppressing certain dangers to the health of the community may be through the instrumentality of private suits. A single case in which damages are assessed for conveying infection through articles of food, as of typhoid in milk[16] will do more to improve the sanitary condition of similar establishments than would a great deal of inspection and the issuance of orders. A dairy, a market, or a bakery may be closed, but others similar will be opened, and regulations will be evaded. When, however, the proprietor sees others assessed civil damages (not prosecuted and, as he thinks, persecuted by some overzealous official), it opens his mind to his individual responsibility. Through political influence he may get the enthusiastic official removed, and show perhaps that the prosecution was apparently inspired through personal antagonism; but where the court openly finds him, or his fellow proprietor, to have actually caused injury to his customers, or neighbors, he stands in a very different light in the community. However, the public officer should use great discretion in encouraging such prosecutions, and unless the guilt be very clear the action should not be favored. On the other hand, when the private individual actually brings suit the officer should render such aid in the line of evidence as may be within his control. The officer is the servant of the community, and as such he is the servant of the individual.

The violation of a statute or legal ordinance is *prima facie* evidence of negligence, and when that act in violation of the law has a direct relationship to the injury of which complaint is made, this evidence of negligence has an important bearing.[17]

When a statute, ordinance or regulation enters into the consideration

[13]Bishop, Crim. Law, 264, citing, False Affidavits, 12 Co. 128; *Blasingame* v. *Glaves*, 6 B. Mon. 38; *Harison* v. *Chiles*, 3 Litt, 194; *Wheatley* v. *Thorn*, 23 Miss. 62; *Kennedy* v. *McArthur*, 5 Ala. 151; *U. S. Express Co.* v. *Jenkins*, 64 Wis. 542; *People* v. *Waterbury*, 44 Hun. 493; *Clark* v. *Peckham*, 10 R. I. 35; *Drake* v. *Lowell*, 13 Met. 292; *Corley* v. *Lancaster*, 81 Ky. 171; *Thayer* v. *Boyle*, 30 Me. 475.

[14]Greenleaf, Evidence (16th ed.) 527a; Bishop, Crim. Law, 977 (2); *Fontaine* v. *Moreau*, 11 Q. B. 1028.

[15]Bishop, Crim. Law, 267.

[16]*Frost* v. *Aylesbury Dairy Co.*, 74 L. J. K. B. 386.

[17]*U. S. Brewing Co.* v. *Stoltenberg*, 211 Ill. 531, 71 N. E. 1081; *Channon* v. *Hahn*, 189 Ill. 28; *Hayes* v. *Michigan Cent. R. R. Co.*, 111 U. S. 228.

of a case, the party invoking its aid must be prepared to show that it is in fact law, and that it bears upon the point in question. When it is a municipal ordinance, or an executive regulation, if the question be raised it must be shown that the city, the officer, or the board, had authority to issue such an ordinance, regulation or order.[18] Overlooking this point is one of the great sources of failure in public health work. When a board of health seeks to enforce its rules and regulations, it puts in issue, at the election of the defendant, their validity and reasonableness, and if the defendant in any given case chooses to accept the issue thus tendered he has an undoubted right to do so, and to have the matter determined by the court.[19]

Sanitary enactments are, generally speaking, of three kinds: (1) Things are ordered done, such as the reporting to the proper authorities when a case of infectious disease is discovered. (2) Acts or conditions are prohibited, such as the discharge of sewage into water courses used for public supply. (3) Standards are fixed by enactment, as for the purity of foods and drugs. Violation of any of these enactments subjects the offender to a liability of punishment under the criminal law. This punishment, with certain exceptions, is not in compensation for a wrong done, or injury inflicted. It is intended more particularly to prevent future harm. The criminal prosecution must be dependent upon some act of negligence already existent, though the actual harm may not have occurred. Criminal prosecution may therefore be possible and proper when civil suit would find no ground on which to stand.

That is not a crime which is not prohibited by law. It is not a crime to sell milk containing less than three per cent. of butter fat unless that minimum be fixed by some form of enactment, though possibly under certain conditions the buyer might sometimes have a right of civil action against the seller. Though criminality presupposes that the act or condition has been prohibited by law, it is not necessary that it be prohibited by enactment. It may be prohibited by either statutory or by common law. Without statutory enactment it would be considered criminal to make a water supply unwholesome, and the offense is indictable at the common law.[20]

It is apparent that the befouling of articles of food might very likely be followed by the illness of those who ate the food. For this reason, even at common law, it is regarded as criminal to thus befoul provisions, meant for use in the community,[21] or to sell such food injurious to the public health.[22] Nor is it even necessary that the articles be actually sold. The mere exposure for sale in the market, or the sending of them to the market for purpose of sale is a complete

[18]Hemenway, Public Health, 90, 95, 96, 100, 102.

[19]*Kineen* v. *Board of Health*, 214 Mass. 587, 102 N. E. 352.

[20]*State* v. *Buckman*, 8 N. H. 203; *Commonwealth* v. *Lyons*, 1 Pa. Law Jour. R. 497; *Stein* v. *State*, 37 Ala. 123.

[21]*Rex* v. *Dixon*, 3 M. & S. 11; 4 Camp. 12; *Rex* v. *Haynes*, 4 M. & S. 214.

[22]*State* v. *Smith*, 3 Hawks, 378; *State* v. *Norton*, 2 Ire. 40; *Rex.* v. *Treeye*, 3 East P. C. 821; *State* v. *Buckman*, 8 N. H. 203; *Hunter* v. *State*, 1 Head, 160; *People* v. *Parker*, 38 N. Y. 85; *Goodrich* v. *People*, 3 Parker Cr. 622.

offense at the common law.[23] It has even been held that the common carrier who knowingly brings articles injurious to the public health to market is indictable.[24] It is well recognized, not only as a matter of general opinion, but also by the courts, that manufacturies, which are in themselves entirely harmless, may become nuisances and injurious to the public health when they are located in a thickly populated region.[25] On account of the injury to the public health which noxious trades may occasion, the carrying on such trades in thickly settled communities has been regarded in the common law as a crime.[26]

Evidence.

A man who dams a stream may thereby cause flooding of his neighbor's property. Whether or not that flooding may cause damage to the neighbor, and, if so, how much as measured in money, may be very largely a matter of opinion. In a suit for damages the decision is practically a compromise between the opposing opinions. If, however, the damming of the stream has been forbidden by law, the act of so erecting a dam would be a crime, and in the prosecution of the person accused the question is one of fact, not of opinion—Did he, or did he not, commit the act complained of? Therefore, in a criminal trial it is presumed that the party charged with committing the crime is innocent until he shall have been shown to be guilty, for most persons do not intentionally violate law, and it is presumed that before he committed the act he has considered and found the act to be lawful. The "burden of proof" rests upon the party making an affirmation or charge, and in the criminal case it must be "proven beyond reasonable doubt" that the defendant is in fact guilty.[27] This means, not that the judge or jury believe the defendant guilty, *but that the evidence so proves.* In civil cases, on the other hand, the decision is reached by "preponderance of evidence" (over-weight of evidence). There is, then, sometimes a very great difference between the evidence required in a civil and a criminal case referring to the same act; the same evidence may meet with very different results in the two cases.

The "burden of proof" rests upon the party making the affirmation. Ordinarily in a criminal trial this means the prosecution, but when the accused claims the existence of a license, or permission under a license, he makes an affirmation, and the burden rests upon him, the party of defense, to produce the license.[28] This seems to be the only reasonable way in which to consider the subject. It is a practical

[23] *Reg.* v. *Stevenson*, 3 Fost. & F. 106.

[24] *Reg.* v. *Jarvis*, 3 Fost. & F. 108. A similar line of reasoning was shown in an American civil case, where a railroad was sued for damages for the death of a cow from an infection received from infected cattle which the road was transporting to market, and which had temporarily been freed in the community by the wrecking of the car in which they were being transported. *Grimes* v. *Eddy*, 126 Mo. 168, 28 S. W. 756.

[25] *Meeker* v. *VanRensselear*, 25 Wend. 397.

[26] *Rex* v. *Davey*, 3 Esp. 217; *Moses* v. *State*, 58 Ind. 185.

[27] Greenleaf, Evidence, 14 w, x, y, and 81 c.

[28] Greenleaf, Evidence, 79; Wharton, Crim. Law, 2434; *Potter* v. *Deyo*, 19 Wend. 361; *Smith* v. *Joyce*, 12 Barb. 21; *Pendergast* v. *Peru*, 20 Ill. 51; *Great Western R. R. Co.* v. *Bacon*, 30 Ill. 347; *Gering* v. *State*, 1 McCord, 573; *Sheldon* v. *Clark*, 1 Johns, 513; *U. S.* v. *Hayward*, 2 Gall. 485. *Haskill* v. *Commonwealth*, 3 B. Mon. 342; *Wheat* v. *State*, 6 Wis. 455.

impossibility often for the prosecution to prove that a man has no license, or that his license does not permit certain acts, unless the license (which he claims to be in his own possession) shall be required produced in court. The license may have been issued but not recorded, or other questions may involve doubt as to fact. However, it has sometimes been held that the burden of proof still rests with the prosecution.[29] Ordinarily, it is held that the one claiming a license must show that he has a genuine license, and that means that he must produce the license itself. A certificate that one is licensed is not sufficient;[30] neither is parol license sufficient.[31]

A certificate that a man is licensed will not be accepted by the court because it is not "best evidence." "Best evidence" does not mean most evidence,[32] nor does it have reference to the relative value of the testimony of different witnesses, each having an equal chance to know the fact. The person issuing a certificate that a man has a license may be mistaken. The license may have been revoked; it may be forged; it may have expired; it may not cover the point claimed. If the license actually exists, and is valid, there should be no reason for withholding it from examination. It is the court, not some person writing a certificate, who should pass upon the genuineness of the document, and therefore "best evidence" demands the presentation of the license itself in court.

"The true question, therefore, in trials of fact, is not whether it is possible that the testimony may be false, but whether there is sufficient probability of its truth; that is, whether the facts are shown by competent and satisfactory evidence."[33]

We find, therefore, three classes of evidence. (1) Direct evidence—the testimony of those who speak from positive personal knowledge. (2) Circumstantial evidence—testimony relative to other facts, from which the fact in question may be satisfactorily proven. (3) "Autoptic proference," as it is called by Dean Wigmore[34]—that is, the thing itself, is presented to the court for inspection. If the question be raised whether a shoe be with buttons or laced, evidently the exhibition of the shoe would settle all dispute but a witness may be honestly mistaken. "Inspection is like an admission, in that while it is not testimony, it is an instrument for dispensing with testimony."[35]

In public health work autoptic proference may be a very valuable aid in prosecutions, and it is probably too frequently neglected. A sample of goods may be shown to demonstrate its quality,[36] but care should be exercised to see that it is a fair sample. It has been permitted to show the effects of injurious substances.[37] But it is not proper to have a jury test a sample

[29] *State* v. *Evans*, 5 Jones, 250; *Mehan* v. *State*, 7 Wis. 670.

[30] *Commonwealth* v. *Spring*, 19 Pick. 396.

[31] *Lawrence* v. *Gracy*, 11 John. 179; *State* v. *Moore*, 14 N. H. 451.

[32] Greenleaf, Evidence, 82.

[33] Greenleaf, Evidence, 1.

[34] Greenleaf, Evidence, 13 a.

[35] *Gaunt* v. *State*, 50 N. J. L. 490, 495.

[36] *Thomas Fruit Co.* v. *Start*, 107 Cal. 206.

[37] *Eidt* v. *Cutler*, 127 Mass. 522; *King* v. *Ry. Co.*, 72 N. Y. 607.

of liquor alleged to be intoxicating;[38] neither was it considered proper to kill dogs or rabbits before the jury to show them the effect of strychnia poisoning.[39] This might be forbidden because it was unnecessary, and because it is not necessarily conclusive. It must be remembered that the same chemical or bacterial infection may have a very different effect on one animal from that shown by another. The fact of the presence of a germ may be shown, though the effects may be different from those in the human body. One way to demonstrate the presence of the tubercle bacillus in milk is by injecting some of the milk into healthy guinea-pigs. After a few weeks, if the pig lives, it is then killed, and after it is dead the conditions are carefully noted. This takes time. In such cases photographs taken before the injection, after the development of symptoms, and of the *post mortem* examination, should be good evidence supporting the testimony of the witness. Occasionally the production of the thing in court, or the performance of a demonstrative experiment, may not be of use to the jury because of their lack of technical education. In such cases often all legitimate objection could be removed by explanations made by experts.[40] Such explanation and demonstration may be much clearer to the jury than would the simple testimony. Suppose that the claim be made that a certain article of food, meat for example, has been adulterated by the addition of a chemical preservative. The testimony of the chemist may be to the effect that he found the poisonous substance present and that the sample of food did keep from decay longer than another known to be free from the preservative. His testimony, however, wou'd have much more force if he presented the two samples, sealed in glass receptacles, and kept under the same conditions, if that which he knew was pure showed more deterioration than the other. If in addition, having previously explained what the apparent results of a chemical test would be, he should make the test before the jury, the force of his testimony would be still more weighty.

Ordinarily autoptic proference is presented in the court room, but sometimes it is necessary that the tribunal shall proceed to the point where the object is situated. This is particularly true in the case of many kinds of nuisance. The granting a view is usually held to lie in the discretion of the court.[41] Sometimes the inconvenience of adjourning court for a view may be obviated; as in the case of a fly-breeding manure pile, by bringing into court, in a bottle, some of the maggots. The owner of the pile may present evidence that he has cleaned his pit every week, when in fact he has emptied it, but not cleaned it, and the maggots would be evidence thereof.

Objection has been raised to all admission of autoptic proference on the ground that it is not in a form for presentation in cases of appeal. We are told, however, that this doctrine

[38] *Commonwealth* v. *Brelsford*, 161 Mass. 61; *Wadsworth* v. *Dunnam*, (Ala.) 23 S. 699.

[39] *Rex* v. *Palmer*, Annual Register, 1856, pp. 422, 473, 475.

[40] Greenleaf, Evidence, 13 h.

[41] Greenleaf, Evidence, 13 b, 13 h.

has been repudiated by all the courts whose attention has been called to it.[42]

"It may be mentioned in this place, that though papers and other subjects of evidence may have been illegally taken from the possession of the party against whom they are offered, or otherwise unlawfully obtained, this is no valid objection to their admissibility if they are pertinent to the issue. The court will not take notice how they were obtained, whether lawfully or unlawfully, nor will it form an issue to determine the question."[43] As a rule, when a person induces another to commit a crime he thereby becomes accessory, and as a witness in the case this must be considered, and his evidence weighed accordingly. But when an officer, or even a private citizen desirous of enforcing the laws, believes from general information that the party is breaking the law, he has the legal and moral right to send decoy letters.[44] The fact of the evidence having been unlawfully obtained may very properly be the straw of weight which may influence the court in a doubtful case, especially if the illegality of the obtaining be an unnecessary violation of the law. On the other hand, the very illegality may be necessitated in obtaining evidence. For example: Where there is a law against employing a boy under fourteen years of age there would be no reasonable excuse for so employing a boy of twelve to purchase ordinary articles of food to see if preservatives were used. There would be a practical necessity to employ such a boy to purchase cigarettes, to prepare for the prosecution of a dealer violating a law prohibiting the sale of such articles to boys under fourteen years of age.

It is logic, not the law, which furnishes the test of the relevancy of evidence.[45] The court must be guided by reason in determining whether or not certain evidence shall be admitted; and since the courts are presided over by men it follows that errors may sometimes be made on either side. Nothing should be put into the case unless it have a distinct bearing. Cases are confused, and justice impeded by a mass of impertinent evidence. On the other hand, even high courts may be misled as to the necessity for evidence, and in this matter caution must be observed in following former decisions. With scientific advances legal changes must keep pace. This is well illustrated in a series of cases, particularly referring to the Texas cattle fever. The Missouri Supreme Court held in *Bradford* v. *Floyd*[46] that the defendant could be held liable for damages caused by disease communicated from his cattle to those of the plaintiff, *but that it must be shown that he knew that his cattle were diseased.* This ruling seems reasonable and just, and is in harmony with other cases.[47] Later the Missouri court held that it was not necessary to show such prior knowledge, in a case where a railroad,

[42] Greenleaf, Evidence, 13 j.

[43] Greenleaf, Evidence, 254; *Commonwealth* v. *Dana*, 2 Met. 329; *Legatt* v. *Tollervey*, 14 East, 302; *Jordan* v. *Lewis*, 14 East, 306; *Williams* v. *State*, 100 Ga. 511; *Trask* v. *People*, 151 Ill. 523.

[44] *Ackley* v. *United States*, 200 Fed. 217.

[45] Greenleaf, Evidence, 14 w.

[46] 80 Mo. 207.

[47] *Pate* v. *Adams*, 37 Kas. 133; *Railroad* v. *Finley*, 38 Kas. 550.

transporting cattle from Texas to the Chicago market, was sued for the death of a cow said to have been caused by infection received from these Texas cattle.[48] In the course of his opinion Mr. Justice Burgess said for the court:

"While the proof did not show that the cattle were themselves, in fact, diseased, it is of general notoriety that all cattle in that part of Texas from which these cattle were shipped were infected with a microbe or germ of disease which is taken in by Missouri cattle by injection, that is, taken into the system through the stomach by eating grass over which Texas cattle have travelled, or by drinking water from pools or streams through which they have passed and deposited the germ by dropping, or from ticks. . . . It is now a matter of general information or knowledge . . . that all Texas cattle are infected in their system with a parasite or germ, which is harmless to them, but which taken into the stomach by native cattle produces what is known as Texas fever." Though the fact of general infection of Texas cattle was more true twenty years ago than it is today, the statements of the court as to the method by which the disease was spread are now known to be false. The disease is not spread by taking the germ into the stomach. It is spread only through the agency of the tick. After being gorged with infected blood the ticks drop to the ground to lay their eggs, and their infected progeny climb to new animals and infect them. This takes time. Since the court in that case was proceeding under a mistaken hypothesis when it took certain supposed facts as general knowledge, it shows how necessary it is to prove each step. It is true that cattle may be infected with the disease, and able to give it to others through the agency of the tick, although they may not show any symptoms of disease—they may be immune to the influence of the germ. Justice therefore seems to require that the plaintiff in such a case show either that some of the cattle were sick with the disease; or that their blood contained the suspicious germs; or at least that they were infested with ticks. He should also show that some one of these facts were within the knowledge of the defendant. As to the fact of infection of those specific cattle it might be very difficult for the plaintiff to get any evidence, because of the removal of the cattle to the market. He should at least show that within the knowledge of the defendant that infection was common in the vicinity from which the cattle came. He should further show (a) the presence of the disease germ in the body or blood of the secondary, or local cow; or (b) the presence of ticks upon her body, with symptoms of the disease; and (c) that there was no other discoverable source of infection; and (d) that the symptoms appeared at the end of the ordinary period between the dropping of a tick and the infection through the newly hatched ticks.

Similarly, in proving the transmission of disease through milk, as in the English case,[49] dependence must be

[48] *Grimes* v. *Eddy*, 126 Mo. 168, 28 S. W. 756.

[49] *Frost* v. *Aylesbury Dairy Co.*, 74 L. J. K. B. 386.

had upon circumstantial evidence. Here it was shown (a) that there was upon the dairy farm, or connected with the handling of the milk, a previous case of typhoid fever. (b) That the percentage of persons using that particular milk who had typhoid fever after this primary case was greater than among the users of other milk. (c) That the proportion of cases of infection was greater in the families using that particular milk among those who especially used the raw milk (children) than among the others. (d) That there was no other discoverable common relationship peculiar to those infected. (e) If in addition colon bacilli be found in the milk it shows fecal infection to a criminal degree, and if the specific bacillus of typhoid be surely isolated from the milk the evidence should satisfy any reasoning person.

The health official must remember that it is a very different thing to prepare successfully to prosecute violators of sanitary regulations, than mere informatory examinations. In routine work he may neglect the duplication of witnesses, sealing of packages, and the preservation of remnants of samples. He may thus get information which will be sufficient for his routine work. Often moral suasion is better than criminal prosecution. It gives the culprit a feeling that he is being favored in a friendly way, and stimulates him to return the favor by obeying the requirements; whereas threats and prosecutions arouse retaliatory opposition. No prosecution should be carelessly begun. That is persecution. Little points should all be considered. It is not enough that the health officer is satisfied that the law has been broken, nor that the judge should believe the man charged was the violator. The *evidence must show* that the law was broken, wherein it was broken, and that the party charged was the guilty party. A physician was charged with having prescribed or administered medicine illegally, and the conviction was set aside because the evidence in the record failed to show that he had given any drug or medicine known in materia medica.[50] The testimony of a physician that before he would assume care of a case of miscarriage he insisted and secured from the woman a statement that another physician had given her some medicine "to bring her around," and supported by the presentation of the writing, is not sufficient to prove that the physician so accused did actually attempt to kill the life of a child in utero.[51] Under the best evidence rule, if the woman were living her written statement should not have been admitted, and at best the physician's statement could only be confirmatory evidence, dependent upon direct evidence of the participation and intent of the physician charged. If the statement of a woman be taken under such conditions it must be shown that she made the statement in view of impending death, and as her last statement. This should be embodied in the written document, and if possible it should be sworn to before a proper officer. It should also be proved in case of

[50] *Allen* v. *State*, Okla., 138 Pac. 178.

[51] *Board of Medical Examiners* v. *Eisen*, Ore., 123 Pac. 52.

question, that when the statement was made it was with a full understanding of all that it implied.

The chain of evidence should be complete, from beginning to end, and it should be presented in such order that the relationship of one fact to another may be apparent. To guard against mischance it is better, where conveniently possible, to have a double link chain. For example: In a case where a sausage dealer is accused of putting a chemical preservative in his meat, it is very likely that both he and his clerk will swear that neither did himself put such preservative in, and that he did not see the other do so, and that no other person was employed about the place. This is a double link covering every point. Where a single officer said that he bought such meat and found the preservative it would be one man's word against two. If the officer sent some one else to buy the meat, and after receiving it he took it to the chemist and left it for examination, though each should testify, it would be only a one man chain of evidence, leaving it at any point one man's evidence against two.

The evidence must be carefully prepared, and the prosecutor must know before the trial begins that he has covered every point, and that his evidence is all present. After the jury has been sworn, the fact that evidence is defective so that the trial cannot proceed, as on account of the absence of important witnesses, does not permit or give another trial of the accused for that offense.[52] This is in accord with the provisions of the fifth amendment to the national constitution, which also prohibits the forcing of a person accused of crime to testify against himself. This does not, however, interfere with the right of the accused to give evidence in his own defense.[53]

Penalty Imposed.

Most criminal prosecutions for violations of sanitary laws and regulations are under special legislative acts. These enactments generally provide certain penalties for the punishment of violators. The ordinary provisions are either fine or imprisonment or both. These are also the ordinary punishments imposed under the common law, and when the statutes do not provide specifically for the punishment, the common law provisions rule, and the penalty is either fine or imprisonment, or both.[54] Where the statute says "fine *and* imprisonment," both must be imposed.[55] When the statute says simply fine *or* imprisonment, only one of them may be inflicted.[56]

The object of the punishment in sanitary prosecutions is simply the prevention of further danger in most instances, and the penalty should be selected for that object chiefly. The fine may have this result, and the fines collected may materially help in the expense of conducting the supervision and prosecution. There are, however, two very grave objections to the collection of fines without im-

[52] Bishop, Crim. Law, 1037 (2).

[53] Greenleaf, Evidence, 374; Bishop, Crim. Law, 973.

[54] Bishop, Crim. Law, 940, citing, *Cornelison* v. *Commonwealth*, 84 Ky. 583; *Conner* v. *Commonwealth*, 13 Bush. 714; *Syracuse, etc. Plank Road* v. *People*, 66 Barb. 25; *Atchison* v. *State*, 13 Lea, 275.

[55] *Scott* v. *Chambers*, 62 Mich. 532.

[56] *U. S.* v. *Vickery*, 1 Har. & J. 427.

prisonment. They are often used in certain blackmailing operations. This is especially easy where the pay of an officer depends upon fees. Unscrupulous political officers start prosecutions, or threaten them, and then stop or dismiss the cases on the acknowledgment of wrong on the part of the accused, and the payment a portion of a portion of the maximum penalty. This payment goes into the pocket of the blackmailing official, and lack of compulsory publication enables him to keep the transaction quiet. Because of the knowledge of this form of abuse, honest officials are frequently suspected of a like motive. Even officials who are legally honest, when paid portions of the fines collected, may show zeal in proportion to their possible receipts, rather than to the needs of the community.

Secondly, the payment of fines sometimes gives to the culprit the feeling that he is paying for the privilege of breaking the law, and that therefore he may break it as often as he is willing to pay; and the payments may be less than his profits derived from the business of breaking the law. His profits from selling oleomargerine colored to resemble butter may be a hundred dollars a day. Fines aggregating on an average fifty dollars a day would leave him a net profit of fifty dollars a day. It is practically impossible to successfully prosecute more than a very small proportion of these violations, and the fines imposed are not therefore proportional to the violations. So long as his personal liberty is unrestricted such a man might feel free to pay and break the law. The disgrace and inconvenience of confinement is another thing. It seems reasonable, therefore, that after at least a second conviction all subsequent punishments should include, if the statute permits it, imprisonment, and that the term of imprisonment be necessarily lengthened for each subsequent conviction, perhaps in geometrical ratio. Further, since it is true that some corporations may be especially prone to undertake this form of "business," statutes should make each stockholder personally liable to imprisonment, and imposing still longer terms of imprisonment upon the officers. Imprisonment of some of the officers of such a corporation should be imperative in all cases in which the corporation have previously been fined for a like offense. At the same time, it is no more than just to the community that with the imprisonment a fine be imposed which will, at least partially, defray the expenses of this line of public service. Sanitary laws should frequently bear the penalty "fine *and* imprisonment."

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THE ROCHESTER MEETING.

Have you forgotten or, perchance, not even heard that the 1915 meeting of the American Public Health Association is to be held at Rochester, New York, September seventh to tenth? It is no platitude in this case to say, "*Everything indicates that this will be the biggest meeting in the history of the Association.*" This time "*There's a reason.*" The New York State Department of Health has called the Annual Conference of Empire State Health Officers at the same time and place and has arranged with Governor Whitman to be present and address the meeting.

New York State has some 1,400 cities, towns and villages with separate health officers. Last year about 800 of them attended the conference at Saratoga and this attendance was in no wise extraordinary or attributable to any unusual cause. With the added attraction of meeting with the Ameri-

can Public Health Association there will be many more than 800 of them at Rochester in September.

Because you will have the chance to meet near a thousand health officers and many laboratory workers, statisticians, sanitary engineers, social workers, industrial hygienists and others, you should make a special effort to come to the meeting this fall, but this is not the only reason. The program that is being arranged is based on both attractiveness and utility and will be sure to appeal to you.

The question involved in the increasing death-rates from the so-called "wear and tear diseases" of middle and later life must soon receive more general attention on the part of health workers. One of the sessions of the General Association will be devoted to the discussion of this topic. The health workers of the country must extend their efforts in this neglected field and must begin preaching with greater emphasis the need for personal hygiene and the health duties that the individual owes to himself. Of the comparatively few men who have thus far demonstrated their recognition of this important problem and their capacity to discuss it, a number of the leaders will be present at Rochester.

Health workers must be primarily educators and secondarily policemen. *Public health education must come first.* One session of the General Association will consist of a symposium on the educational features of public health work. There will be papers by some of the men who have shown themselves most apt in acquiring the successful technique required in this highly important department of public health work. To attain the maximum of usefulness, the health worker must be able to handle publicity and educational work.

Another of the general sessions will be devoted to the "Milk Question" and will be a joint session of the Association with the Laboratory Section. The responsibility of public health authorities for the protection of the milk supply from infection is one of the things which must be emphasized more than has been the case in the past.

The President's Address, by W. T. Sedgwick, Professor of Biology and Public Health at the Massachusetts Institute of Technology, will be worth hearing. Professor Sedgwick is one of the pioneers in public health work and has been training health officers for many years. His message will be an important one.

The chairmen of the program committees of the various sections all report progress and are optimistic that there will be no falling off in the standards of the programs of previous years.

Then there is the important question of the proposed revision of the Constitution and By-Laws of the Association. This is a matter of the greatest significance to the Association and furnishes an added reason why the attendance should be unusually large.

The local committee, headed by Dr. Montgomery E. Leary, President of the New York State Sanitary Officers Association and the committees of the flourishing Rochester Public Health Association and other interested citizens are giving time, money and thought without stint to the work of making your visit to Rochester a pleasant as well as a profitable occasion to you. It is hoped that you will repay their efforts by a large attendance.

The entertainment program will be of the highest order. Special attention is to be paid to the visiting ladies.

A preliminary announcement will be sent you in the course of a few weeks. This will give you the main facts with regard to the hotels, entertainments, places of meeting and program. Be on the lookout for this. Meanwhile make a note in your diary that you are going to be in Rochester, New York, September seventh to tenth.

THE HARRISON ANTI-NARCOTIC ACT.

It is daily becoming better known that opium, its derivatives and cocaine are being used in alarming amounts all over this country. Various factors, such as the careless prescribing of these drugs by physicians, the spread of habit from person to person, the cupidity of druggists and patent medicine manufacturers, and vice and dissipation are responsible for the existing conditions.

It was the hope of those familiar with this vicious traffic that the Harrison Act would save the situation. This act went into effect March 1. It surrounds the importer, manufacturer, wholesale and retail druggists with ample restrictions but it exempts the practising physician. Why? It has been shown repeatedly that the physician is the greatest single factor in drug addict formation,—worse than the patent medicine man, worse than the criminal druggist, worse than dissipation and vice! The Harrison Act; Subdivision A, Section 2, permits the "dispensing or distribution of any of the aforesaid drugs to a patient by a physician, dentist or veterinary surgeon registered under this act in the course of his professional practice"; right here the act fails. Up to the present writing no official interpretation of "in the course of his professional practice only" has been forthcoming from the Department of Internal Revenue. It has been hinted from official quarters that the act has reposed a great trust in the physicians of this country. Meanwhile the prescribing of these drugs to addicts goes merrily on all over the United States!

Not until prescribing by physicians is limited to the treatment of disease or the cure of habit; until free treatment is provided for indigent users and until no "trust" is imposed in any group of men, except those sworn to enforce the law, will prohibitive legislation put an end to the present shameful conditions.

It would appear that the utmost to be hoped from the Harrison Act, in its present mutilated state, is an accumulation of data relating to the extent of drug addictions in this country that may shock the nation into demanding of Congress suitable legislation.

Why Congress should have introduced these weak and indefinite clauses into this important measure and then dumped it on the Department of Internal Revenue to interpret and enforce is not evident to those interested in this momentous question. It can possibly be explained in part by patent medicine money, in part by manufacturers and wholesalers, possibly in part by some misguided members of the medical profession both in and out of Congress. However explained the fact remains that the Harrison Act, as finally enacted, shows every evidence of attempting to evade a proper recognition of the factors underlying this national problem.

C. E. Terry.

THE DAIRYMAN VERSUS THE DAIRY.

DR. CHARLES E. NORTH,
Director North Public Health Bureau, New York.

AS PROGRESS continues in the improvement of milk supplies, the relative values of the several factors which contribute to produce the best results become more clear. The invention of the dairy score card a number of years ago was the first real attempt to define and put a value on the different items in the list of sanitary recommendations. The score card has proved a most useful instrument for educational purposes. On the other hand, it fails in the light of more modern knowledge to give sufficient emphasis to factors of primary importance and to delegate to the background factors of secondary and even insignificant importance.

In an earlier publication* on this subject I pointed out my personal experience of a number of years in the production of certified milk, during which time I was surprised to discover that milk almost equal in sanitary character to the milk produced in my expensive sanitary cow stable could be produced in a very old and dilapidated barn on the same farm merely by the exercise of the simplest sanitary precautions. Bacterial tests for an entire year gave an average in the model sanitary barn of 1,097 bacteria per cc. while the milk produced in the old barn in the same year averaged 3,102 bacteria per cc. This led me to propose the production of clean milk on a large scale in ordinary dairy barns by the institution of similar methods. I first established this system at Homer, N. Y., where in the ordinary barns of seventy-one dairy farmers I produced an average of about 10,000 quarts daily of milk which most of the time contained less than 10,000 bacteria per cc. in a raw state. For a period of four years now this method has been in use under practical business conditions, and continues to be successful through the exercise of the simple sanitary precautions I established which are now controlled by the expert in charge of the laboratory in the central milk station. The details of these methods have been described in previous publications.†

These same principles were again demonstrated two years ago in the shipping station at Sparks, Md., where twenty-eight dairy farmers within six weeks' time reduced the average of their mixed milk from over 2,000,000 to under 40,000 per cc. In like manner at the milk shipping station in Oxford, Pa., during the past fall and winter, eighty-seven dairy farmers have been trained to produce clean milk, and by the same system of control

* "A Method of Milk Production," New York Medical Record, February 15, 1908.

† "Sterilizing Stations in Dairy Districts," Journal of the American Public Health Association, September, 1911. "The Production of Sanitary Milk by Our Present Milk Producers," Fifty-ninth Annual Report, State Board of Agriculture, Boston, Mass., 1912.

have reduced the bacteria in the mixed milk at that station from an average of several millions to an average under 50,000 bacteria per cc.

As a matter of fact the Grade "A" milk on the New York City market which has grown in the past year from a few thousand quarts to over 110,000 quarts daily is produced in the dairy barns of the rank and file of dairy farmers through the adoption of similar methods carried out under the supervision of the large milk companies of New York City. This means that any dairy farmer can at small expense be taught how to produce clean milk.

The object of the present article is to relate the circumstances of a demonstration recently completed, which had as its purpose a comparison of the work of two groups of dairy farmers producing milk at different times in the same dairies. Forty points are allowed in the dairy score card for equipment and sixty points for methods. "Methods," refers largely to the activities of the dairyman himself, while "equipment" obviously relates to the inanimate objects such as barns, milking utensils, etc. From this it seems fair to assume that the score card considers the dairy as having an importance of 40 per cent. and the dairyman an importance of 60 per cent. in securing a clean finished product. After my experiences in Homer, N. Y., and Sparks, Md., I stated that the dairyman should have a value of 75 per cent. and the dairy a value of only 25 per cent. After my experience at Oxford, Pa., I stated that the dairyman has an importance of 90 per cent. and the dairy only 10 per cent. On a number of occasions I have stated that dairy farmers after having been properly trained in sanitary methods could be organized into a company and marched around the country from one dairy district to another and that they could on the day of their arrival in any dairy district produce clean milk. To confirm this statement by actual experiment was the purpose of the demonstration herein described.*

The work was carried out as follows: A bacteriologist was sent to a large milk shipping station at Kelton, Pa., where no effort had previously been made to introduce special sanitary methods or to make bacterial tests of farmers' milk. In short, the station and the dairies and the dairy farmers conformed in every way to the general character of places supplying the bulk of Philadelphia market milk. Without any announcement of his purposes the bacteriologist proceeded to take samples of milk each day for a period of six days from the cans delivered to the station by fifty-four dairy farmers. After the first two days it was possible to know which of the farmers were delivering milk containing the largest numbers of bacteria. These men were selected as best fitted for the purposes of the demonstra-

*This demonstration was made possible by the courtesy of Abbott's Alderney Dairies, a large milk company of Philadelphia, Pa., which placed at my disposal the two shipping stations mentioned and through its representatives made all arrangements for the coöperation of dairy farmers as well as furnishing laboratory facilities for the bacterial tests.

tion proposed and subsequent tests were limited to the milk from the dairies showing the highest counts.

At the same time arrangements were made with the milk company to secure a supply of covered milking pails and forty-quart milk cans, all of which were properly washed, rinsed, sterilized and dried. Application was made to the milk station at Oxford, Pa., for the services of a number of the eighty-seven dairy farmers bringing milk to that station, these men being selected from the list because of the excellent records shown by them for a period of six months in producing milk with small numbers of bacteria. The laboratory tests of the milk of the Oxford farmers were already a matter of record. The last six tests of the milk of ten Oxford men previous to their participation in the demonstration are given in the tabulation below:

BACTERIAL TESTS OXFORD DAIRYMEN'S MILK.

(On Oxford Dairies.)

March 17 to April 5, Inclusive.

Dairyman.	Test No. 1.	Test No. 2.	Test No. 3.	Test No. 4.	Test No. 5.	Test No. 6.
No. 1	13,000	13,000	21,000	4,000	21,000	20,000
2	7,000	13,000	23,000	4,000	60,000	18,000
3	4,000	19,000	25,000	8,000	24,000	17,000
4	20,000	8,000	21,000	11,000	19,000	23,000
5	15,000	4,000	16,000	7,000	22,000	18,000
6	6,000	20,000	19,000	24,000	22,000	25,000
7	10,000	20,000	26,000	22,000	12,000	11,000
8	21,000	9,000	9,000	15,000	11,000	22,000
9	10,000	22,000	23,000	12,000	21,000	13,000
10	20,000	15,000	24,000	16,000	29,000	80,000

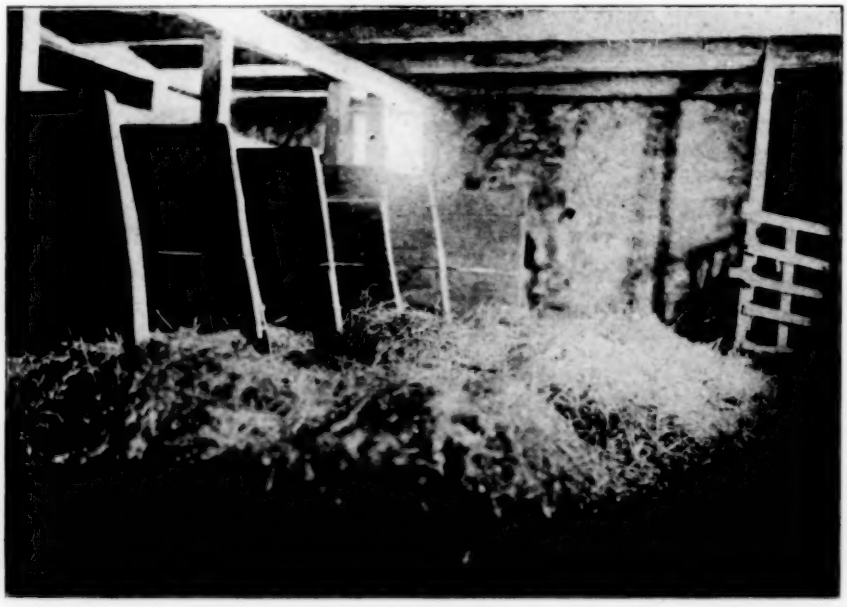
From the above it appears that these ten farmers were consistently producing very clean milk. Their record for the past six months corresponds very closely with the figures given in the above tabulation. The last column represents samples milked on the night of April 4 on Oxford farms.

The afternoon of April 5 was designated as the date for carrying out the demonstration. The ten Oxford men indicated in the above table met me at the Oxford milk station where the purposes of the demonstration were described to them in detail. With myself and assistants they took the train leaving Oxford at 2.08 p. m., which arrived at the milk shipping station at Kelton, where the demonstration was to take place, in less than an hour.

At Kelton we were met not only by the Kelton dairymen who had been

selected to participate in the demonstration, but also by the majority of the other dairymen bringing milk to that station. These men had assembled because they desired to learn about the prospects for establishing the Grade "A" milk business with its system of premiums for clean milk.

The demonstration proceeded by pairing off the ten Oxford men with Kelton farmers, who conveyed them in their wagons to their dairy farms. Covered milking pails and milk cans properly washed and sterilized had previously been taken to these farms. The afternoon milking of April 5 was performed on each of these ten farms by the Oxford farmers. Each



Interior of one of the Kelton cow stables where demonstration took place. Milk produced in this stable is shown in the last tabulation of bacterial tests of milk as No. 2 in the list.

of these men carried out such detailed precautions as his own personal experience at home had taught him were useful. I was able to visit five of these dairies while the milking was progressing.

The milk produced on these ten farms remained in the cans and was cooled in the usual manner by standing in tanks or tubs of spring water, excepting in one instance. This one exception was the case of an Oxford farmer, No. 1, who packed his forty-quart can of milk in a bank of snow in an effort to excel his competitors.

The Oxford men finished their work in time to take a train leaving the Kelton station at 6.08 p. m. The times of their arrival and departure are

noteworthy inasmuch as they show that these dairymen unfamiliar with these dairy farms were on the premises for a period of not more than two hours in all.

The milk produced by the Oxford dairymen remained overnight on the Kelton farms. On the following morning, April 6, the bacteriologist took samples from the cans of milk brought to the Kelton station from these ten farms. The results of all of the analyses of samples taken from these farms previous to the demonstration and on the day of the demonstration appear in the following table:

BACTERIAL TESTS OF MILK PRODUCED ON KELTON DAIRIES.

By Kelton Dairymen.						By Oxford Dairymen.
March 29.	March 30.	April 1.	April 2.	April 3.	April 5.	April 6.
1,200,000	1,160,000	60,000	60,000	57,000	1,830,000	3,300
.....	.....	950,000	2,800,000	680,000	1,520,000	3,100
570,000	910,000	810,000	380,000	1,000,000	4,830,000	4,600
2,000,000	760,000	3,000,000	1,200,000	940,000	4,000,000	7,000
5,000,000	500,000	1,600,000	1,000,000	.....	1,450,000	4,100
290,000	1,100,000	600,000	3,000,000	2,600,000	3,600,000	61,000
1,400,000	.....	320,000	.....	8,000,000	60,000	800
11,000	9,000	.....	.....	.....	.....	2,500
4,000,000	2,100,000	2,200,000	540,000	56,000	70,000	1,600
1,900,000	800,000	380,000	1,600,000	1,110,000	500,000	5,600

The above tabulation shows a remarkable contrast between numbers of bacteria in the milk produced on these ten Kelton farms by the Kelton dairymen and the numbers in the milk produced on these same farms by the Oxford dairymen. To those who have not been through similar experiences, the small numbers of bacteria in the last series of tests may seem unbelievable. These numbers in every case excepting one are even less than those found in most of the tests of milk produced on Oxford farms by the Oxford dairymen. One explanation for this is the fact that pails and cans were sterilized with special care for the demonstration, and in addition to this every Oxford farmer was stimulated to exercise more than usual care because of his desire to excel in this demonstration. In the case of farm No. 6 the Oxford man complained that much dust was raised due to sweeping out of the stable at milking time by the Kelton man.

Such results in ordinary barns are now well recognized as possible not only in my own experiences at the several milk shipping stations mentioned, but also in the experience of the milk dealers producing Grade "A" milk

for New York City market and in the reports of many milk laboratories both public and private. In this particular case duplicate samples of milk were sent to an independent laboratory, both of samples taken April 3, previous to the demonstration, and samples taken April 6. The results confirm in every way the results of my own test.

No changes whatever were made in the Kelton dairies. Such items as ventilation of barns, character of the floor, disposal of manure, cleaning of cows, whitewashing of barns, lighting, character of water supply, and numerous other items listed on the score card remained unaltered. The majority of the Kelton dairies had no milk houses whatever, using open tubs or troughs in the yard for cooling purposes. The Oxford men used the Kelton barns as they found them. They were successful mainly because they concentrated attention on factors of primary importance in producing clean milk. They milked with dry hands into sterilized milking pails having mouths only five inches in diameter. They kept their forty-quart milk cans in places sheltered from dust. With one exception they avoided raising a dust during milking time. They refused to use strainers of metallic gauze or of cloth because the same were not properly washed and sterilized. They refused to use stirring rods or dippers in cooling milk. They used no unsanitary coolers or aërators. In every case cooling was done in forty-quart cans by standing them in barrels or tanks.

If one should attempt to eliminate all nonessentials or matters of secondary importance and draw up a statement of the factors which are of primary importance and which even alone are sufficient to produce under the conditions found in ordinary dairies a milk so clean that it will have with great regularity a bacterial count of less than 10,000 bacteria per cc., the list of fundamentals would be as follows:

1. Milking with dry hands into covered milking pails.
2. Proper washing and sterilization of milking pails and milk cans.
3. Cooling milk by placing cans in tanks of cold water or ice water.
4. Regular laboratory testing of milk for bacteria and payments based on laboratory tests.

This last item furnishes the strongest possible stimulation to the milk producer, not only because it supplies constant information concerning the character of the product, but also because the financial inducement to the producer is based on results and not on conditions at the dairy, and consequently the producer bends all efforts to secure results.

In drawing conclusions from the above demonstration it must be noted that the dairies were a common factor to both groups of dairy farmers—the same barns, the same cows, the same surroundings were used by both. The only difference in equipment consisted in the covered milking pails and the proper sterilization of milk pails and milk cans in the case of the

Oxford farmers. These were undoubtedly factors which contributed largely to the successful results, and their value must be duly considered in estimating just how much credit should be given to the care exercised by the Oxford men and to the differences in the character of the utensils used. While the milk cans are sterilized at the central shipping station the covered milking pails are regularly washed and sterilized on the dairy farms themselves, consequently the sterilization of milking pails is a matter for which the dairyman himself is responsible. On several of the farms in this demonstration the Oxford men insisted on scalding out their milk pails and milk cans as a final precaution before going to work. Covered pails can be found on many dairy farms but are on exhibition only as ornaments and are not put into practical use. The use of the covered pail is something that must be credited to the man entirely apart from its presence on the premises. Here again, therefore, the man himself is the primary factor.

I believe the above demonstration justifies the conclusion that the dairyman is the chief factor and the dairy of secondary importance. The clean dairyman may be transported from dairy to dairy and can make clean milk wherever he goes. The thing that is most certain to induce a dairyman to produce clean milk every day is to base his payments on results. The product is the thing and not the score. In securing the product it is the man and not the dairy.

THE ACCURACY OF AMERICAN CANCER MORTALITY STATISTICS.

FREDERICK L. HOFFMAN,
Newark, N. J.

Read before the Section of Vital Statistics, American Public Health Association, Jacksonville, Fla., November 30–December 4, 1914.

THE accuracy of cancer mortality statistics depends,

First, upon the final diagnosis of the attending physician who signs the certificate of death;

Second, upon the statistical practice or the methods employed in classification, tabulation and analysis.

Diagnosis, according to one of the recognized authorities on the subject, in its narrower sense, "consists in bestowing a name upon a certain assemblage of pathological phenomena." In a more comprehensive sense of the term, according to the same authority, diagnosis includes "also a knowledge of the causal factors of the disease; a determination of its character with reference to type and severity; an estimate of the amount and kind of damage, both general and local, which has been sustained by the organism; a forecast of the probable course and duration of the morbidity process; and a cognizance of the personal characteristics of the patient, whether psychic or physical, inherited or acquired."*

The primary object of medical diagnosis is the successful treatment of disease for the purpose of cure and the prevention or postponing of death. The assigning or determination of the final cause of death is, and always must be, a secondary consideration in the practice of medicine. The sphere of diagnosis is large, complex and more or less ill-defined The perfect diagnostic method includes a variety of widely different processes, but in the main reliance is placed, according to Butler, upon the clinical diagnosis based upon symptoms of disease manifested during life; differential diagnosis or the process of distinguishing between different diseases which resemble one another more or less closely; and anatomical diagnosis or a knowledge not only of symptoms or phenomena, but also of definite anatomical alterations on which the phenomena depend (this in its general sense constitutes the usual post-mortem diagnosis); pathological diagnosis, which has to do with the nature of a lesion without regard to its situation and the modifications of function and changes in structure caused by disease, and finally, physical diagnosis, which consists of physical (objective) signs irrespective of subjective symptoms and which in part requires the aid of instruments of precision, including the use of the microscope and chemical analysis.

* Diagnostics of Internal Medicine. Glentworth R. Butler, M.D., D. Appleton and Co., New York, 1905.

This formidable array of methods and processes emphasizes the complexity and variability of the diagnosis of disease before death. The term "disease" does not admit of a precise definition; but a generally accepted one reads that disease may be defined as "a change produced in living things in consequence of which they are no longer in harmony with their environment." Even the term "death" does not admit of a precise definition: for, while according to James Ritchie, the natural termination of life might be looked for when the cells of the body by a gradual process of decay fail to maintain the exchange of material which is characteristic of life, the body "is so complicated that death from such a pure condition of senility occurs but rarely." Even if we confine our view, according to the same authority, to "deaths due to disease, we find in the great majority of cases that death occurs either when the tissues have not reached their full maturity, or while they still possess adult vigor." The difficulties of exact diagnosis are therefore enormously increased by the complexity and ill-defined nature of disease and death which occur under innumerable varieties of conditions and circumstances. Accuracy in medical diagnosis represents in its final analysis that indefinable something called *judgment* which is largely the result of gradually acquired knowledge and experience. The summary result of the numerous diagnostic processes and methods must and always will defy complete analysis and absolute verifiable accuracy.

Deaths in human beings result from a multitude of causes which occur usually in combination to a more or less indeterminable degree. The International Classifications of Causes of Death includes only 189 specific diseases or groups; but this limitation is entirely as a matter of practical convenience. Not only are the direct or specific causes of death much more numerous, but it is rare that death is due absolutely to a single cause. The practice of differential diagnosis or the development of the medical judgment to distinguish between the various diseases in which each individual symptom may be observed constitutes the most involved and perplexing branch of the practice of medicine. The principle has been laid down by French* "that a particular symptom attracts special notice in a given case, and that the diagnosis has to be established by differentiating between the various diseases to which this symptom may be due." There are, however, practical difficulties which preclude the drawing of a precise line of demarcation as regards the symptoms themselves. The domain of medicine is so vast that even the most experienced physician, with a large practice extending over a generation, could not possibly master all the principles of medical diagnosis with absolute certainty and unerring accuracy.

The limitations of the human judgment when applied to the study of

* Index of Differential Diagnosis of Main Symptoms by various writers edited by Herbert French, M. A., M. D., Wm. Wood and Co., New York, 1913.

mortality problems are still more apparent in the methods of statistical practice, or the recording, classification, tabulation and analysis of deaths.

The classification of deaths for statistical purposes is far from having attained to a degree of scientific conclusiveness. The International Classification by single causes leaves the much more complicated classification of joint causes in an unsettled condition. The liability to error in the final assignment of causes of death is therefore quite serious, and likely to remain so for many years to come. It is only recently that the first official list of joint causes with suggestions for their proper assignment in the international classification of single causes has been published by the Division of Vital Statistics of the Census. Rumsey, some forty years ago, pointed out the numerous fallacies which are inherent in every disease classification. In a recent study of the experience data of the Johns Hopkins Hospital I have fully discussed these difficulties, as best brought out by the Bellevue classification of diseases and its correlation to the International Classification of Causes of Death. If the attending physician would in all cases give a full statement of primary, secondary and possibly additional contributory causes, a material improvement would result in the accuracy and completeness of our vital statistics. Efforts in this direction are constantly being made by the Division of Vital Statistics of the Census, by state and municipal registrars and other agencies interested in mortality problems. An investigation made by the Metropolitan Life Insurance Company has established the fact that in certainly not less than 5 per cent. of the mortality returns a material correction is required to secure a proper determination and assignment of the final cause of death.

In its final analysis the determination as to what constitutes the primary or immediate cause of death must remain largely a matter of judgment more or less subconsciously arrived at by the attending physician. Time and opportunity will often be wanting to enable the most scrupulous and competent physician to determine the true cause of death with the required degree of scientific accuracy and completeness. In statistical practice it will often be found that the more obvious or self-evident causes require to be given secondary consideration, as for illustration, in the case of cancer jointly reported with bubonic plague, or pneumonia reported as a sequence to an accident. Autopsies or post-mortem examinations are unquestionably desirable in a much larger proportion of cases than is at present the fact, even in the experience of our foremost hospitals. The frequently suggested requirement of an autopsy in the case of every institutional death would, however, offer no final solution of the problem of accuracy in mortality statistics. The making of post-mortem examinations is as much a branch of science as bedside diagnosis on the part of the attending physician, and the conclusions arrived at by both methods may be widely

at variance and yet each may be relatively true. Evidence of preëxisting disease disclosed by an autopsy may not warrant the conclusion that the original clinical diagnosis was erroneous and that the secondary cause or condition was directly related to the fatal termination. It has properly been observed in this connection that, "the cause of death is not always to be found in the organ primarily affected or which shows the most pronounced lesions." Autopsies are without doubt a most useful aid in medical education, and in fact are essential for the highest development of diagnostic skill. The outlook, however, is absolutely hopeless for securing an autopsy in the case of every death in a public institution, and at best and at most, therefore, the facts disclosed by existing methods of death registration can by their nature reveal the truth only with approximate accuracy.

The foregoing observations apply with peculiar force to cancer as a cause of death. The questions which require consideration are: First, whether the recorded cancer mortality at the present time is a true statement of the facts; second, whether the observed rate of increase in cancer frequency is real or only apparent because of recent improvements in diagnosis and methods of death registration and classification. To both of these important questions I feel confident an affirmative reply can be made with the reasonable assurance that present-day conclusions are a close approximation to the truth; in other words, the assertion that there are approximately 75,000 deaths from cancer per annum in the United States at the present time, and that the death-rate from malignant disease is on the increase at the rate of about 2.5 per cent. per annum, may safely be considered as approximately and relatively true. For all practical purposes it is immaterial whether the actual mortality from cancer is a little more or a little less; or whether the true rate of increase is or is not ascertainable within perhaps a fraction of a decimal. The two general conclusions resulting from our present statistical knowledge of the cancer problem are: First, that the disease is much more common than has generally been assumed to be the case; second, that the approximate mortality therefrom is such as to constitute cancer the fourth in importance as a cause of death in the United States at ages 45 and over.

These important and far-reaching conclusions rest fundamentally upon the approximate accuracy and completeness of our death registration and the accuracy of the medical diagnosis which determines the assignment of the final cause of death. Bashford, Cabot, Oertel, and others, have brought forward evidence to prove that our American vital statistics are intrinsically untrustworthy; that our clinical diagnoses are frequently seriously erroneous; and that the status of medical education and medical practice in the United States must be considered deplorable. Bashford has even gone so far as to assert that our American vital statistics are less trust-

worthy than those of Ceylon. Oertel rests his drastic conclusions upon 388 autopsies at Bellevue Hospital, of which, however, the clinical diagnosis in its entirety was not confirmed in 27.6 per cent. of the cases. In Oertel's own words, "Every one well informed knows that clinical diagnoses even by very good physicians are extremely uncertain; much more so, of course, when made by the ordinary practitioner." The conclusion requires only to be stated to emphasize its intrinsic untrustworthiness. He further observes that "internes and physicians are often utterly unconscious of the responsibility they carry in this matter (death certification). In private practice where autopsies are less frequent than in institutions things are apt to be even worse." And the final conclusions "that the only reliable death certificate is the one made by the experienced pathologist after autopsy," and "that the majority of clinical diagnoses are either wrong or grossly insufficient," are equally contrary to the facts and to common-sense.

In the *Lancet* for April 18, 1914, Oertel re-argues his case in apparently a very plausible manner, to the effect that, "our clinical records and death certificates are poor because our physicians lack the objective training that can be derived from necropsy and competent teachers." He maintains "that this uncertainty and inaccuracy is particularly great in the United States of America where the importance of necropsies and the study of pathological anatomy which are indispensable to good diagnostic ability have always been grossly neglected." No one familiar with the facts of American medical progress and confronted by the indisputable evidence of a low death-rate throughout practically the entire country and a material reduction in the death-rate during the last thirty years will be prepared to accept the foregoing conclusions, in general, nor in their special application to the cancer problem.

The several studies which have been made of diagnostic findings in the light of subsequent autopsies confirm the conclusion that the results as regards cancer were apparently much more satisfactory than in the case of many other important causes. The two most trustworthy investigations, by Cabot of Boston, and Rogers of Calcutta, substantiate the conclusion that in the main the clinical diagnosis of cancer deaths was reasonably accurate. The diagnosis of cancer is not as difficult as is often assumed to be the case, even without the aid of an exploratory surgical operation or the use of the microscope. This conclusion, of course, applies chiefly to external or conveniently accessible cancers, although even in the case of some of the internal cancers an accurate clinical diagnosis is frequently possible. The question under consideration does not involve the problem of clinical diagnosis of cancer in the initial stage, but only the final terminal diagnosis made just previous to the patient's death. Any one with much knowledge of actual cancer cases will confirm the con-

clusion that regardless of serious difference of opinion in a debatable number of cases, the large majority of fatal forms of cancer, whether external or internal, are not diagnosed with much difficulty or with a serious chance of error in the terminal stage.

Cancer is an ancient disease, and innumerable references thereto occur throughout medical literature from the earliest times. Granting that early conceptions regarding the nature of cancer were grotesquely erroneous, there is no evidence that the disease was ever considered indifferently or seriously confused with fundamentally different physiological or pathological processes. It would, of course, be absurd to maintain that no real progress has been made in the diagnosis of cancer, especially with reference to improvements in death certification. The argument, however, is advanced without the slightest fear of successful contradiction, that the better understanding of the nature and function of malignant disease which prevails at the present time cannot be assigned as an explanation for the observed material increase in the recorded cancer death-rate throughout civilized countries.

The table following exhibits the mortality from cancer in the registration area of the United States during the decade ending with 1912. In addition to the rate per 100,000 of population, the increase or decrease in the rate from one year to another is shown separately and the percentage of such changes, together with the relative rate for each year, assuming 1903 as 100.

MORTALITY FROM CANCER, U. S. REGISTRATION AREA, 1903-1912.

Period.	Population.	Deaths from cancer.	Rate per 100,000 population.	Increase or decrease in the rate.		Relative rate —1903 taken as 100.
				Actual.	Per cent.	
						No. per 100.
1903	32,701,083	22,325	68.3			100
1904	33,345,163	23,395	70.2	+1.9	2.8	103
1905	34,052,201	24,330	71.4	+1.2	1.7	105
1906	41,983,419	29,020	69.1	−2.3	3.2	101
1907	43,016,990	30,514	70.9	+1.8	2.6	104
1908	46,789,913	33,465	71.5	+0.6	0.8	105
1909	50,870,518	37,562	73.8	+2.3	3.2	108
1910	53,843,896	41,039	76.2	+2.4	3.3	112
1911	59,275,977	44,024	74.3	−1.9	2.5	109
1912	60,427,247	46,531	77.0	+2.7	3.6	113

This table is suggestive of the inherent trustworthiness of our cancer mortality statistics. The annual rate is shown to have varied more or less, but the general tendency has been persistently towards an increase, measured by the two extremes of a minimum rate of 68.3 for 1903 and a maximum rate of 77.0 for 1912. For seven out of the nine years following 1903 the rate increased, but during two years the rate declined. If, therefore, the argument were sound that the observed increase is the result of improved methods of diagnosis and death certification, then the observed decline during very recent years should be an explanation of the reverse. Such a conclusion would obviously be absurd. Compared with the year 1903 taken as 100, the relative rate for 1912 was 113; in other words, in that year the rate was 13 per cent. in excess of the rate ten years ago.

Some additional illustrations of the increase in cancer frequency follow for the purpose of illustrating the persistent upward tendency of the cancer death-rate throughout the United States. For example, the quarter-century cancer death-rate of Philadelphia during the period ending with 1888 was 42.6 per 100,000 of population, whereas during the last quarter-century ending with 1913, the rate was 69.0. There was therefore an actual excess in the rate of 26.4 per 100,000 of population. The corresponding increase in the cancer death-rate of New York City during the same period was from 46.5 to 70.5. The actual increase in the rate was therefore 24 per 100,000 of population. In New Orleans, Louisiana, the rate increased from 51.1 to 70.6, or 19.5 per 100,000 of population. The observed increase in the rate of these three representative large American cities was therefore in approximate conformity. It would be utterly incredible to assume that this increase measures only an improvement in medical diagnosis and death certification and not a greater liability to malignant disease. In fact, there are reasons for believing that during the earlier period under consideration a much larger proportion of tumors of the non-malignant type were classified as malignant; but it requires to be taken into consideration that the actual proportion of non-malignant tumors in the tumor mortality is not very large. It must further be considered that during the intervening period of years the results of operative treatment has shown a constant tendency to improve, as was well brought out in the very interesting address on the Progress of American Surgery, by Dr. F. S. Dennis, on the occasion of the International Congress of Arts and Sciences held in St. Louis in 1904. In consequence of operative treatment a considerable proportion of persons now die from other diseases than cancer and a small but significant number of cases occur in which suicide is preferred to a lingering death from what has not inappropriately been called the human scourge.

Taking the foregoing facts and observations into consideration it would seem a safe conclusion that the present-day liability to cancer is somewhat

greater than shown by the mortality rate, because of the effects of operative treatment and other methods and means by which the lives of cancer patients are prolonged with the practical certainty of death resulting ultimately from some other cause.

As previously pointed out, cancer in the majority of cases is a perfectly obvious disease, not difficult of accurate diagnosis. The conclusions based upon the early Frankfurt data, advanced in the investigation of Messrs. Newsholme and King, are contradicted by the facts of subsequent experience. The argument advanced by these two distinguished authorities on medical and actuarial science was to the effect that the observed increase in cancer frequency had only affected inaccessible or internal cancers not admitting under non-operative conditions of an accurate diagnosis. The table following for the city of Frankfurt for two recent periods fully confirms the contrary conclusion that internal as well as external cancers are on the increase in that city, which is generally considered to have one of the most perfect systems of death certification in the world. It may be said in this connection, that the results for Frankfurt are fully confirmed by the critical analysis of recent English, Bavarian and American statistics.

This table is perhaps the most instructive contribution to our knowledge of the statistical aspects of the cancer problem. The table absolutely disproves the earlier theory regarding the non-increase in mortality from cancer of the external organs or parts.

The argument that the observed and recorded increase in cancer is primarily the result of improvements in diagnosis is not new. Walshe, in his treatise of 1844, refers to the greater accuracy of diagnosis as a probable explanation of the steady increase in cancer mortality during the previous century. Coley in a statistical discussion on the increase in cancer mortality, published in 1909, has advanced the claim that "actually the death rate from cancer is *far* greater than the rate shown by the vital statistics, for the reason that there is prevalent among the laity a strong prejudice against the name 'cancer,' the result being that in *many* cases of death from cancer, especially metastatic cancer, with internal complications, the family physician out of respect for this feeling on the part of the family, will assign some of the secondary causes in place of the actual primary cause of malignant disease." This statement is not substantiated by any facts derived from actual experience. That some such cases may occur is self-evident; but that in a large number of such cases there should be a deliberate falsification of the death certificate is incredible. As a matter of fact, it is very rarely that a death certificate itself comes to the notice of the family of the deceased. Coley also refers to the earlier investigations by Guliot of Rheims, who made a study of the accuracy of certified cases of cancer with the result that he found that the number who had actually died of the disease was exactly double the number certified to have

MORTALITY FROM CANCER IN FRANKFURT—A. M., BY ORGANS AND PARTS OF THE BODY, ACCORDING TO SEX, 1906–09 AND 1910–13.

MALES.

Organs.	Deaths from cancer.		Rates per 100,000 population.		Increase or decrease in percentage.
	1906–09.	1910–13.	1906–09.	1910–13.	
Skin	3	6	0.4	0.8	100.0
Digestive organs	470	540	68.5	74.2	8.3
Respiratory organs	32	23	4.7	3.2	−31.9
Urinary organs	21	27	3.1	3.7	19.4
Generative organs	6	8	0.9	1.1	22.2
Other carcinoma	25	29	3.6	4.0	11.1
Sarcoma	28	35	4.1	4.8	17.1
Other malignant tumors	23	46	3.3	6.4	93.9
Total	608	714	88.6	98.2	10.8

FEMALES.

Organs.	Deaths from cancer.		Rates per 100,000 population.		Increase or decrease in percentage.
	1906–09.	1910–13.	1906–09.	1910–13.	
Skin	12	8	1.5	0.9	−40.0
Digestive organs	447	500	54.4	57.2	5.1
Respiratory organs	25	17	3.0	1.9	−36.7
Urinary organs	5	20	0.6	2.3	283.3
Generative organs	244	288	29.7	33.0	11.1
Other carcinoma	76	80	9.2	9.2	0.0
Sarcoma	26	30	3.2	3.4	6.3
Other malignant tumors	24	48	2.9	5.6	93.1
Total	859	991	104.5	113.5	8.6

so died. This statement is also open to the same objection that the necessary evidence in detail is not supplied in a conclusive and trustworthy manner. In contrast to the point of view that the observed increase in cancer is the result of improved diagnosis, Coley refers to the conclusions of Mitchel Banks, in his opinion one of the most careful students of cancer in Great Britain, to the effect that "while the diagnosis of cancer in its early stages was probably made much more frequently now than in former times, it required little skill to make the diagnosis at the time of the death of the patient," and that "the diagnosis at such a time was by no means beyond the ability of even the rural practitioner of fifty years ago."

W. R. Williams, in this connection, has pointed out that the actual increase in cancer during a long period of years has been so enormous as to preclude the possibility of the same being chiefly or largely due to improved diagnosis. The same author has called attention to the important fact that in earlier years many diseases were diagnosed as cancer or classified as such which would now be returned under other terms.

The subject has been discussed by Lawrence Irwell in a contribution to the *Insurance Age* (May, 1913), with special reference to incomplete death certification, or rather the absence of a mention of the organ or part of the body affected by the cancerous growth. He maintains that cancer deaths without a mention of the site of the disease should not be taken to mean that the decedent necessarily died of cancer, because if the physician who was responsible for the document did not know where the neoplasm was located, he was not in a position to certify that a malignant tumor was primarily responsible for his patient's death. This point of view is not well taken, because in former years it was considered fully sufficient, and in a general way it is even now under prevailing methods of registration, to return an unquestionable death from cancer without mention of the organ or part of the body affected. The omission is not evidence of inability on the part of the physician to properly diagnose the case, but simply a want of proper appreciation of the statistical significance of additional details.

There are numerous references in the medical literature of the subject to the larger number of demonstrated cases of cancer on autopsy than were recognized during the lifetime of the patient. Riechelmann, among others, has shown that in the Berlin hospitals 20 per cent. of the cases found on autopsy to have been deaths from cancer were not previously recognized as such. More modern findings to the same effect are merely cumulative evidence of a fact quite generally known and understood among those familiar with cancer diagnosis. As previously stated, there can be no question of doubt but that autopsies or post-mortem examinations would in a number of cases disclose evidence of cancer lesions without necessarily warranting the conclusion that under the present methods of death certification a reasonable degree of accuracy in the returns is not obtained. Hospital

patients, particularly those of public institutions, are not a suitable class of subjects for investigations of this kind. Under the serious limitations of public hospital practice it must often be much more difficult to make a satisfactory diagnosis of the cause of death than in private practice. A large number of hospital patients are but a short time under observation; they are of a class from which it is often difficult to obtain a true past history of the disease on admission, and it is unfortunately true that the medical attendance is frequently superficial and indifferent. At most, such cases do not constitute more than from 5 to 10 per cent. of the mortality from all causes, and the chance of error, even if as high as 20 per cent. in a particular disease, would not be likely to very seriously affect conclusions based upon aggregate mortality returns. The results of specialized research in this direction are of the greatest practical value to students of medicine, and most of all in the teaching of medicine on the basis of accurately determined pathological conditions. Improvements are necessary in medical diagnosis and methods of death certification, but the existing amount of error in both ought not to be made the basis of an effort to destroy public faith in returns which in the main faithfully and conclusively reflect a true state of facts.

In its final analysis the cancer mortality problem rests upon the statistical law of large numbers. Errors or defects in the quality of the original data have a normal tendency to balance each other. If the argument is sound that the increase in cancer is entirely the result of improved methods in death certification or medical diagnosis, then a decrease in the cancer death-rate would obviously establish the reverse. While it is true that the general tendency of the cancer death-rate throughout the world is in an upward direction, there are numerous important exceptions to this conclusion. Even in the United States, and in some of our large cities, the cancer death-rate has in some years actually decreased. No one would maintain that this decline in the rate was the result of diminished medical or statistical efficiency. Observed over a long period of time the cancer death-rate, however, shows an unmistakable and practically universal upward tendency. Regardless of the controversy whether the rate is actually increasing or only apparently so, the menace of cancer is today conclusively established, and the fact cannot be gainsaid by anyone that the annual loss of life due to this frightful scourge is now approximately 75,000; and being practically limited to ages 30 and over, the disease is therefore of the greatest importance and its effectual control is a pressing problem of public policy. There is little to be gained by the largely academic discussions as to whether cancer is actually or relatively on the increase, or whether there is a small margin of even serious errors in the quality of the fundamental underlying facts. There is likely to result much harm, however, from discussions which tend to impair public confidence in the trustworthiness

and conclusiveness of the facts derived from official sources, and a resulting lack of public interest in the essential problems and practical methods of a nation-wide effort at cancer control. The burden of proof that the existing data on cancer mortality are untrustworthy and misleading rests upon those who make the assertions; but all that has thus far been published in support of such allegations, pretensions or speculations fails to substantiate the point of view.*

* NOTE. The recent investigation of the coroner's office in New York City adds additional information to the debatable question as to how far the aggregate mortality returns are impaired in value by erroneous or even fraudulent returns made in the relatively small group of cases which properly require the coroner's attention. There can be no question but that the evidence is quite conclusive that the number of autopsies and post-mortem examinations made in so large a city as New York is ridiculously small. Not only from a medical standpoint, but also from the point of view of legal jurisprudence, the present conditions are deplorable. It is true, no doubt, that in many suspicious deaths the exact cause is not established and the coroner's records are undoubtedly misleading, especially as regards the causes of death, which are frequently not verified. That these conditions have a bearing upon the problem under consideration cannot be questioned; but I feel confident that in so far as these conclusions affect the cancer problem they may safely be considered of small importance, for the coroner's cases are chiefly representative of a class which is not typical of cancer patients. A large number of cases are infants and a considerable proportion represent sudden deaths due to natural causes, which can only include a relatively small number of cancer cases. The highest degree of accuracy is unquestionably desirable, but it would be most unfortunate if public confidence in the value of the available statistics were destroyed because of a margin of error which cannot be considered as sufficient to invalidate general conclusions.

THE PREVALENCE OF OCCUPATIONAL FACTORS IN DISEASE AND SUGGESTIONS FOR THEIR ELIMINATION.

RESULTS OF A STUDY CONDUCTED AT THE CENTRAL FREE DISPENSARY (RUSH MEDICAL COLLEGE) AND COOK COUNTY HOSPITAL, CHICAGO.

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THE purpose of this paper is, first, to point out the socially wasteful practice of administering daily to person after person for the same types of morbidity, due to the same causes, and, secondly, to emphasize a much neglected sphere of etiology, the proper conception of which is contained in the term "industrial relations."

The research summarizes a study of (1) United States Census Mortality Statistics of Occupations; (2) 65,000 dispensary records and many hundreds of cases personally seen during a two year period at Rush Medical College (Central Free Dispensary); and (3) the medical portion of 27,887 cases in which the patients received treatment in Cook County Hospital during the year 1913.

(1) Attention is first directed to an arrangement of mortality statistics somewhat different than forms customarily shown. An analysis of the Mortality Statistics of 210,507 persons engaged in 140 occupations in the Registration Area of the United States exhibits the percentages, for the census year 1909 (the only year in which complete tables were published) given in Table 1.

From the table we see a marked difference in the prevalence of certain wasteful death causes between the two classes compared, We also note that the agriculturist stands a one-in-three chance of reaching old age (70 years), while the others' probability is but little better than one-in-eight. None can fail to grasp the significance of this table. To disclaim the importance of these figures on the basis of incorrect diagnoses and uncertainty of occupations is unjust. The fact that only the registration area is included, and the recency of the reports answers the first point. As to the second feature, Wilbur[1] has shown that where another or previous occupation could have been a factor, it amounts to less than 1 per cent., which is less than ordinary errors of transcription.

(2) Before proceeding further it is necessary to explain one or two terms. *Industrial health-hazards* may be defined as working conditions which, while they may not impair the more resistent worker until after a prolonged

TABLE 1.
MORTALITY AMONG OCCUPIED MALES.*

	Those in agricultural pursuits.	Those in 131 trades and callings.
	Percentages of all deaths.	Percentages of all deaths.
Deaths from *preventable* causes ($\frac{9}{7}$ are diseases)†	27.4	43.0
Deaths from *degenerative* diseases (under 70 years of age)‡	26.5	31.2
Total deaths after 70 years of age	35.9	13.4

* *Occupied males* include professional callings, officials and proprietors, those engaged in domestic and personal services as well as those we ordinarily term real workers, namely, those in trade and transportation, manufacturing and mechanical pursuits, miners, quarrymen, etc., composing a total of 140 chief occupations—including those engaged in 9 agricultural pursuits.

† Deaths from *preventable causes* include typhoid fever, pulmonary tuberculosis, pneumonia (under 70 years), alcohol, lead poisoning, other occupational poisonings, suicide, accidental poisonings, accidents and injuries, rheumatism, bronchitis, pleurisy and hernia—for the last four, only such deaths as have occurred under 70 years are included.

‡ Deaths from *degenerative diseases* include cancer, diabetes, apoplexy, heart disease, "other circulatory diseases" (4,858), asthma, cirrhosis of the liver, "other liver diseases" (880), and Bright's Disease. There remain in the census classification, 27,105 deaths from peritonitis, appendicitis, "other respiratory, digestive, nervous," and "all other causes," a large percentage of which were also undoubtedly preventable or prematurely degenerative, but which are not taken into consideration in the classification given above.

period, produce morbid conditions in the average worker, and tend ultimately to create preventable and degenerative diseases in all persons so subjected. The hazards, arranged schematically in order the better to remember them, are (1) dust, (2) dampness, (3) darkness, (4) devitalized air (including motionless and vitiated air), (5) heat, (6) cold, (7) fatigue, (8) inactivity, (9) compressed air, (10) infections, (11) poisons, and (12) industrial *stimulantism*—the latter a common condition created by the belief among many workers that alcohol, strong coffee, etc., limit or counteract the effects of dust, poisons and other hazards; it is also promoted by dirty, disordered and depressing surroundings and the absence of proper thirst-assuaging facilities at the work-place. It is understood that each of the above-named hazards stands for a class of component hazards.[2]

Among 65,000 different applicants at Rush Medical College (Central Free Dispensary) there were 15,475 persons with definite trades. Professional persons, laborers, housewives and nondescripts were excluded in summarizing. Of this number 10,370 had afflictions deemed not occupa-

tional or controversially so, and were also excluded—such were venereal, surgical, and acute infectious diseases; sexual, senile, and certain skin, ocular (including refractive errors), ear, nose, throat and some nervous diseases. Certain trade tendencies could be noted in many of these; a good part of the surgical cases were strictly occupational. The balance, or 5,105 trades persons, or about one-third the total number of trades persons, worked at occupations having definite health-hazards, and had afflictions which such hazards were producing and definitely promoting. Such circumstances would render them applicants for industrial compensation for occupational diseases according to many foreign provisions[3]—"the diseases (scheduled) shall be deemed to have been due to the nature of that employment unless the contrary is proved,"—the burden of proof lying upon the employer, who has to show that the worker has not been subjected to work hazards which could produce the disease in question.

Among 2,500 consecutive applicants at the Central Free Dispensary Branch of the Chicago Tuberculosis Institute were 875 trades persons engaged in occupations surrounded with definite and well known health-hazards. Of this number 615 were found to be tuberculous, 125 were not positively diagnosed and the balance were not suffering from tuberculosis. Of 368 patients who were intelligent and answered questions, 259 made complaints of working conditions involving dust, light, dampness and ventilation. Their statements were not taken as to the more insiduous hazards such as poisons, fatigue effects, liability to communicable diseases, temperature exposures, and industrial alcoholism.

(3) In Cook County Hospital in the year 1913 there were 11,022 adult medical cases. Of this number, at least 2,866, or about 27 per cent. were persons engaged in definite trades having well known health-hazards and were suffering with afflictions which were induced or promoted by such hazards. None of these, so far as we know, received compensation or even condolence from the sources responsible, nor indeed were their cases investigated by an executive branch of the government.[4]

It might be considered advisable to give a division of *all* of these 11,022 persons by "occupations" and by diseases. This was attempted, but it suffices to say that a large majority of this class of "down and out" patients have no regular occupations, and that, also, the term "occupation" as used in a charitable institution of this sort is capable of such loose construction that, unless each case is painstakingly examined, records and casual statements more often mislead than direct. The term "laborer," for instance, was found to apply to practically all occupations.

In the hospital diagnoses of these 11,022 medical cases, one finds none classified under the head of "occupational," or "industrial" diseases. Turning next, however, to the prominent poisons, and running them through, the records disclose cases charged to industry as given in Table 2.

TABLE 2.

CASES OF POISONING CHARGED TO INDUSTRY.

	No. of patients.
Lead poisoning	47
Arsenic poisoning	3
Wood alcohol poisoning	1

But if such a search is extended to *disease which might be occupational*,—such as dermatitis, eczema, bronchitis, tuberculosis, heat-exhaustion, tetanus, flat-foot, lumbago, rheumatism, constipation, gastritis, pancreatitis, appendicitis, nephritis, neuritis, and particularly neurasthenia, one finds many comments upon the history sheets savoring of occupational etiology. In fact, after such a search one comes to the conclusion that almost any medical complaint may be occupational, or at least may have in its etiology an important occupational factor!

As limited in number as are the *lead poisoning cases* above noted they are more frequent in occurrence than in the year 1910 in the same hospital. In spite of all legislation which followed the report of the investigation by the Illinois Commission upon Occupational Diseases in the year 1910, they have still continued to come[5] and in several instances from the same identical workplaces.

An analysis of the principal symptoms given on the history records used for arriving at a diagnosis in the cases of plumbism is given in Table 3. It is based upon forty-six of the cases, as one patient absconded from the hospital before clinical features could be determined:

TABLE 3.

PRINCIPAL SYMPTOMS IN FORTY-SIX CASES OF PLUMBISM.

	Per cent.		Per cent.
Colic	98	Basophilic degeneration	43
Constipation	91	Headache	42
Lead line	80	Albumen and casts	29
Vomiting	78	Multiple neuritis	27
High blood pressure*	75	Wrist drop†	18

* Determined in only 16 cases. In no case was it less than 125 mm. Hg., but in 12 cases it was more than 100 plus the age in years.

† The detection of lead paresis, preceding paralysis, can be made early, in the case of the arms, by the use of the hand dynamometer. (See "Critical Examination of One Hundred Painters for Evidences of Lead Poisoning," E. R. Hayhurst, Am. Jr. of the Med. Sc., June, 1914, CXLVII, 6, 788–810.)

The high percentage of lead lines shows quite conclusively that many cases without lead lines were not diagnosed as plumbism, since this sign is certainly not present in over one third of even acute cases. Most lead workers are instructed and have learned to take "salts" regularly and as a result do not suffer much from colic, constipation, vomiting and headache, but they do suffer nevertheless from chronic plumbism as is shown by weakened neuromuscular function, blood pressure determinations, facial pallor, impaired nutrition, affected kidneys, hardened arteries and fundus oculi examinations.

Analyses show that a total of 530 patients were engaged in processes which exposed them to lead in its various forms. As mentioned above, but forty-seven cases were recognized as industrially poisoned in the scrutiny of the histories of these cases. Among the balance we cite below the details of 25 selected cases. Space alone limits the publishing of many times this number. I do not question the diagnoses made, necessarily, but wish to comment upon their incompleteness. (The hospital diagnosis is given first, with civil statistics, and some of the symptoms; then the results, in briefest form, of our own investigations in connection with each case):

Case 1.—Aortic Aneurism. Laborer, aged 52, U. S., signs of aneurism, with symptoms of angina pectoris. Symptoms beginning four months previously. Found to have worked for the past three years in a lead factory, inordinately exposed to lead. This case ended fatally, presumably by rupture of the aneurism. Four and one-half months in the hospital.

Case 2.—Alcoholic neuritis and *nephritis.* Laborer, aged 40, U. S. Found to had have an attack of acute plumbism 2 months before, with wrist drop. Had his first attack 12 years before.

Case 3—Musculo-spiral paralysis and *multiple neuritis.* Laborer, aged 32, Pole, double wrist drop, blue line, basophilic degeneration. Found to be a lead worker. Later suing his employers for his condition. How much the hospital diagnosis will help or hinder his suit is left to the reader to conjecture.

Case 4.—Arterio-sclerosis. Painter (general), aged 54, U. S. History of several lead poisoning attacks and in the hospital but a few months before, for "lumbago."

Case 5.—Neurasthenia. Plater, aged 27, Pole, first symptoms appeared 3 months previous. Found to work at electroplating, in a place where he was exposed to lead in almost every form (fumes, dust and solutions).

Case 6.—Chronic interstitial nephritis and *myocarditis.* Painter, aged 59, German. Found to have worked in a sign-shop for years, under close confinement, doing a great deal of sandpapering of painted surfaces, and to have had several acute attacks of plumbism during the past 13 years. (Died after 18 days in hospital.)

Case 7.—Chronic parenchymatous nephritis. Painter (general), aged 34, American. Found to have had 3 attacks of undoubted acute plumbism in the past 16 years.

Case 8.—Constipation. "Iron molder"—such was his regular trade, but he worked in a paint factory for one week, putting paint in cans—aged 38, Pole; symptoms acute. Stated that the workroom was filled with dry paint dust, and that masks were "more or less" constantly worn.

Case 9.—Pus appendix, gangrenous (diagnosis made by abdominal section). Russian, aged 31, within the past year a farmer in Russia. Sick for past 4 months. Found to be a white lead molder, and made great complaint of the amount of lead fumes and dust he was compelled

to breathe. Place of employment the same from which 4 other cases of lead poisoning had come to this one hospital within the period of our observations.

Case 10.—Pelvic abscess (right). Painter (general), aged 52, Swede. Sick 2 weeks before entering hospital. Had a slight blue line and complained of attacks of colic. Death the third day in hospital.

Case 11.—Delirium tremens (incipient). Painter (general), aged 57, Irish. Several attacks of lead poisoning in the past 40 years. Now complaining of colic and cramp-like pains in all extremities.

Case 12.—Acute rheumatic fever. Wagon painter, aged 56, Irish. Complained of pains in hands and feet. Has had lead poisoning several times in the past 13 years.

Case 13.—Acute gastritis, lead poisoning (history record filed under first head). Iron fitter, aged 35, German. Blue line and colic for past 3 weeks. Also attack of colic 9 months ago. Found to be engaged at painting with red lead, and also doing house painting, on the side.

Case 14.—Organic heart disease and *acute pharyngitis.* Plumber, aged 35, U. S. Complaint, palpitation and sore throat. Found to have had symptoms of lead poisoning in this same hospital one year previous.

Case 15.—Chronic constipation, brass poisoning. Brass factory worker, aged 37, Russian. Complained of colic, and has a typical blue line at gum margins. (There are no symptoms in this case suggestive of "brass poisoning.")

Case 16.—Chronic rheumatism and *acute uremia.* Painter (general), aged 60, Irish. Sick for past 2 months. Entered hospital in semicomotose condition with convulsions. Found to have had lead poisoning as far back as 20 years. (Case eventually improved enough to leave hospital.)

Case 17.—Brass poisoning. Brass molder, aged 28, Pole; colic and obstipation. Had a blue line and marked basophilic degeneration. (This is a plain case of lead poisoning, however, in a brass molder.)

Case 18.—Pellagra. Brass grinder, aged 38, U. S. Sick 2 months. Had a distinct blue line, also pigmentation and edema of face, neck and hands. Found to have worked at the same place in Chicago for the past 4 years, and to have had lead colic and wrist drop 11 years previously (same occupation).

Case 19.—Brass poisoning. Filer of brass and lead, aged 28, Lithuanian. Had severe digestive disturbances for 8 weeks, also pallor, emaciation, lumbar and abdominal pain with tenderness, a blue line and hemoglobin 60 per cent. Found to have been a meat wagon driver until 3 months ago, when began work at present place, where he complained of marked fumes, dust and steam. (This is another plain case of lead poisoning.)

Case 20.—Catarrhal jaundice. Laborer, aged 28, Greek. Sick 21 days,—colic. Found to be a lead smelterer, and from the same place where several other positive cases of lead poisoning occurred, several of whom entered this hospital within the past year. The firm is an old offender.

Case 21.—Chronic nephritis and acute fibrinous pleurisy. Painter (general), aged 48, Scotch. Complaint: pains in chest and back. First attack 5 months ago. Weakness in wrist and hand grip as tested by hand dynamometer. Painter for the past 30 years.

Case 22.—Acute appendicitis—at operation appendix could not be found, but there was a local peritonitis. Laborer, aged 39, Italian. Complaint: colic. Sick 5 hours. Found to be a worker in a paint factory.

Case 23.—Infected amputation stump. (The discharge diagnosis from a medical ward appears to have been sort of a compromise, since nothing of definite inflammatory character developed in the stump after 2 weeks in the hospital.) Painter, aged 43, U. S. Complaint: general symptoms for the past 2 months, most pronounced in amputation stump. Probably chronic alcoholism also a factor. However, was in hospital 3 years previously for plumbism.

Case 24.—Neurasthenia. Painter, aged 42, Hungarian. Complaint, abdominal pain. Had similar attacks off and on for the past 4 years. Found to be a passenger car painter, and com-

plained strongly of breathing paint dust. There have been many cases of lead poisoning reported, both at this hospital and elsewhere, among his fellow workers.

Case 25.—Para-typhoid fever. Battery assembler, aged 23, Lithuanian; abdominal colic, blue line. Found to work in a storage battery factory, exposed to much lead dust. Also had all symptoms of lead colic 8 months previous.

This series illustrates how easy it is for primarily occupationally diseased cases to be lost sight of in terminal complications; the necessity of going deeply into the exact occupational risks which the patient has endured; and the lack of significance of the term "laborer." Furthermore, these cases emphasize very well the social waste in continuing to treat, and failing to diagnose etiologically cases which keep coming from the same sources, trades and callings year after year.

Industrial *arsenic* poisoning is not frequent in Chicago, yet the three cases noted above were hardly one fourth of the total in this one hospital; another ten cases (all acute), which we could discover, were termed "dermatitis," "eczema," and "acute gastritis." In this connection it is well to state that, in several instances these patients gave their previous regular occupations, such as "boilermaker," "electrician," and "jeweler," instead of mentioning their recent arsenic-industry employment, when questioned by the hospital entry clerks.

The three diseases given in Table 4 were correlated with occupations of the patients; the figures give the numbers which were in whole or in part occupational in character:

TABLE 4.

OCCUPATIONAL CASES IN THREE DISEASES.

	No. of patients.
Chronic nephritis	265
Rheumatism (various forms)	417
Organic heart disease	333

In the case of the latter disease it is well to mention the efforts now being made in New York and at Cincinnati to select proper forms of work for such patients after discharge, in order to prevent occurrence and recurrence of non-compensation and consequent return to hospitals.

No cases were recorded of *pheumonoconiosis*, or of its various forms, as *siderosis*, *chalicosis*, *aluminosis*, etc., although there were a total of 134 cases of *chronic bronchitis* without efforts at etiologic diagnosis.

There were recorded 229 cases of *arterio-sclerosis*. Unfortunately an

idea of the extent to which fatigue-substances, heat-toxins, and extrinsic poisons of industrial origin may have entered into this class of cases can rarely be gained from present day histories anywhere, hence any idea of using the information for shutting off the income of such cases is at once precluded. They are all charged apparently to the account of moral hazards, or disease misfortunes.

There were 156 cases of *neuritis* of various types. While the preponderance of alcoholism and drugging as causal may be admitted, each should be searched for the likelihood of industrial poisoning, both extrinsic and intrinsic. For example, multiple neuritis occurs at a given rate among all alcoholics, but among those exposed to lead it is unusually common. We did not find time to go into these.

There were 157 cases of *neurasthenia* for which no other cause could be found than exhaustion, and we know that every effort was made by diagnosticians to keep this number minimal. Why should not the cause of such exhaustion be inquired into with the idea of naming it etiologically, and, if industrial, as it probably is in 90 per cent. of the cases, of recording it as "*occupational* neurasthenia"? If each such case were looked at from this point of view, corrective agencies would have a case to investigate.

There were twenty-eight cases of pes planus, fifteen cases of tetanus, and numerous cases of skin disease, heat exhaustion, neuralgia, uremia, etc. Here and there was a mention of work etiology, but the mention was productive of nothing. In fact it was lost sight of entirely through the absence of a heading in the filing system under which to place "occupational complaints." It is largely on this account that so few occupational diseases can be found in institutional records anywhere (they are nearly all alike in this respect) when one intuitively feels they are omnipresent, especially if any field work has been done in industrial health-hazards.

During the course of the year 1913, there were in the hospital *2,230 adult cases of tuberculosis* (I understand that not over 50 of these were "repeats"), 1,800 males and 430 females. One may safely say that practically none of these had active tuberculosis at the age of 14 years! The question is why and how have they acquired it since? How many of them would have it now had they lived an agrarian existence, for instance? The predisposing causes of their tuberculosis may be placed under three heads. (1) Moral hazards, (2) domestic or housing hazards, and (3) industrial hazards. These three factors operating, perhaps, in unison, have caused either a reawakening of latent childhood infection, or have invited environmental infection. Without disregarding the importance of the first two hazards, I am of the opinion that the importance of industrial hazards has been greatly underestimated in almost every case, and that it is useless to fight tuberculosis unless the daily eight to twelve hours of vocation be investigated and supervised. The so-called "occupations" under which these

2,230 tuberculous persons were registered give practically no information of value. For this, it would be necessary to individualize cases. The records show one thing which is certain, however,—that *they keep coming*, and very largely from the same *environments*. One important analysis shows that there was a total of 672 medical patients in the hospital engaged in dusty trades, of whom 284, or 38 per cent. were tuberculous. This is almost double the general tuberculosis rate among the medical (adult) cases in the hospital (20.2%). For "laborers," as a class, the percentage of tuberculosis was 23.3 per cent.

A principal feature is all these cases is to determine exactly the occupations. The principal result should be an etiologic diagnosis as far as possible, including the use of qualifying terms such as "bronchitis, occupational," "neuritis, chiefly occupational," "aortic aneurism, probably occupational," "nephritis—alcoholic and lead," etc. This is similar to uses elsewhere, as seen in such descriptive terms as *puerperal* sepsis, *tuberculous* pneumonia, *typhoid* fever, and diabetes *mellitus*.

It must not be forgotten that patients themselves are densely ignorant of what constitute health-hazards; that they calmly accept them as a matter-of-course, and unworthy of notice; that the competition for work is great, and (one comes to realize) so much greater than everything else is *the innate desire in man to work*, especially before middle life—a desire which, in the normal man, equals his appetite and seeks to be satisfied in spite of all conditions.

Suggestions for the Solution of the Problem of Occupational Diseases.

The health-hazards of industry which cannot be feasibly removed are insignificant in number.[7] The best proof is the fact that certain establishments engaged in the industries and processes in question have circumvented such hazards, and invariably to the improvement of production, as well as labor attitude and relations.

(1) First, there is needed a nomenclature to designate properly what is meant by "occupation." No one word will do this. The word "occupation" as used in medical parlance, hospitals, institutions, anti-tuberculosis society records, etc., should be abolished absolutely. A little study of some of the application blanks of insurance companies, particularly those carrying sickness insurance, offers many suggestions to framers of history sheets, social statistics, nurses' records, etc. After considerable study, and several years of field and statistical experience with this question, we have evolved and are using a scheme to take the place of the word "occupation" as outlined in Table 5.

TABLE V.

SCHEME TO TAKE THE PLACE OF THE WORD "OCCUPATION."

INDUSTRIAL RELATIONS.

(As Stated by the Patient.)

	Present.	Past.	Previous (to past).*
1. Name of employer			
2. Address of employer			
3. Business of employer			
4. Calendar years worked here			
5. Department(s) worked in			
6. Particular process(es) engaged in			
7. Health-hazards† exposed to			

* For acute afflictions it is not necessary to go back beyond a few days or weeks, perhaps. For recurrent afflictions one should go back months or years. For chronic afflictions it is necessary to go back preferably five years or more. It is not to be expected that the busy entry clerk will fill out this record. It should be the duty of the history taker, oftentimes with the aid of an interpreter, and, if significant, even with outside assistance.

† Question "7" should be answered wherever there is any possible relationship between the patient's affliction and his industrial relations.

The above is not dissimilar to what is ordinarily inquired into by the average insurance company. The question at once arises, Should not social and charitable institutions demand just as thorough an investigation of industrial relations as a sickness insurance company? Certainly the taxpayers of a community have a right to demand as much.

(2) It is a serious handicap to many interests that there is today no logical classification of occupations in existence. To different persons the same term conveys quite dissimilar intelligence.—With the information obtained from the use of the blank form above, a *logical classification of occupations* may be attempted. While the names and addresses of employers are not necessary for the classification in question, they should be required on all institutional case records as legitimate information pertinent to the care and supervision of the case. With the facts secured by answers 3, 5 and 6, any given type of worker and all of his kind may be descriptively and distinctively classified. A scheme to classify occupations must collate "industry," "business department" and "trade process." It therefore requires three descriptive terms to do this. "Industry" must be considered, because, for example, a fireman at a zinc smelter-works is subject to considerably different hazards than a fireman in the boiler room of a public building; "business department," because, for example, a cook with

a railway construction gang has considerably different hazards than a cook on a railway dining-car, etc. Let us apply this principle to a heterogeneous collection of workers (Table 6).

TABLE 6.

THE COMPLETE STATEMENT FOR "OCCUPATION."

Industry.	Department.	Process.
Pottery	Clay shop	Jiggerman
Pottery	Glaze room	Dipper
Vehicle	*Painting*	Painter and sander
Agr. implements	*Painting*	Dip machine laborer
Iron and steel	Butt mill	*Furnaceman*
Brass and bronze	Foundry	*Furnaceman*
Iron founding	Foundry	Laborer
Any business	Nondescript	Laborer

In this way it is possible to classify anyone's trade or calling exactly. As in the case of "iron foundry," redundancies seemingly occur, but these are only apparent; for all the information obtained is necessary to exactly identify each worker's industrial application and environment.

It is not necessary for two persons to describe the terms exactly alike for a given case; nor, in the case of the same activities at two separate places, is it necessary to have descriptions identical, word for word. The information given under the three headings will invariably convey intelligence enough to enable a third person to comprehend fully just what is meant. The statistician is at liberty, furthermore, to enlarge the groups so as to come under the usual general industrial headings: agriculture, professions, personal service, trade and transportation, manufacturing and mechanical pursuits, and miscellaneous.

(3) With the occupation definitely known and the health-hazards recorded, the weight of these in the affliction at hand can be estimated. The next step is to *investigate and verify* the patient's statements. Right here is where our system of social service fails. It is at present nobody's official business to attend to this.—This function should constitute a part of the *statutory business of the community health department* whose findings, when positive, with recommendations and suggestions, should be given over to the proper (state) executive department. It should also become a corollary obligation on this health body to lead in the hygienic education

of the workers, and to some extent of the employers, by drawing up rules and regulations to be observed by both of them and to be posted in workplaces as health-placards. This last function should not be hampered by having to wait for preparatory legislation aimed at each line of industry, as is now the usual manner of remedying such conditions. This power is just as much the rightful function of the health body as any of the offices it now performs. *This power should be legalized and made mandatory on the health body.*

(4) The enforcement of such regulations should depend, in the end, on the *compensation principle*, by which the employer will soon undertake to supervise his own plant, quite independent of the state's enforcement, as well as the health of his workers, both in and beyond the workplace, the latter on the now accepted theory that the employer has a right to demand "his money value for his expenditure for labor." Physical supervision, medical examination of employees, and a better selection of workers for the job will be the first effects of this system, while workers whose sicknesses are the results of moral or domestic hazards will soon be educated into line, or eliminated from industry. As industrial relations usually determine home conditions and habits, it would appear rational at all times to make an attack on delinquent social conditions at the place of employment.

Summary.

As a result of considerable study of hospital and dispensary cases and records, of vital statistics, and of field investigations, we reach the following conclusions:

(1) Occupied persons, other than agriculturists, suffer an enormous mortality (figures show 74 per cent.) from well-recognized preventable and prematurely degenerative diseases.

(2) Occupational diseases exist because industrial health-hazards exist. Responsible employers do not realize the existence of either, while treating agencies take little cognizance of employments.

(3) From one-fourth to one-third of the medical afflictions of tradespersons are due in whole, or in great part to industrial health-hazards.

(4) In institutions, the vast majority of industrial diseases are lost sight of through failure to properly recognize the industrial relations of the patients; to make etiologic diagnoses; and to classify properly in subsequent filing.

(5) Specific occupational diseases, such as lead poisoning, are not recognized in more than one out of three or four instances, more especially the chronic cases.

(6) Present-day institutional records are of value only in showing the enormous numbers of representatives of groups of industrial pursuits who are below the physiologic normal, and who seek medical aid for preventable afflictions. Such records have little value to the student of economics.

(7) A most important first remedy is a proper nomenclature for industrial relations to take the place of the word "occupation." Such a nomenclature is here propounded. The chief feature of this is the introduction of the term "industry-department-process" for the word "occupation." Adoption of this proposed term, furthermore, renders a logical classification of occupations possible. No such classification now exists.

(8) The powers and functions of the community health-governing body should be extended to the prompt investigation of all industrial complaints, and to the prompt remedying of them without the necessity of preliminary legislation against certain alleged responsible industries.

(9) In spite of the fact that the state in which this study was made has an Occupational Disease Law, workers are still coming into its charitable institutions from the same types of trades, and in some instances, from the same manufacturing establishments, in even greater numbers than at a period three years previous, when the Illnois Commission on Occupational Diseases made its investigation. This, we charge, is most directly due to the non-existence of a correlating body between the hospital and the factory.

(10) Too much importance is usually given to alcoholism, with a failure to appreciate that subjection to industrial health-hazards in itself induces and promotes stimulantism.

As a noted health officer has stated, many occupational afflictions might well be made the subject of a grand jury investigation, and others, of a coroner's inquest. The enormity of the public and private sums now spent on preventable sickness and death should induce those who pay the tax to bend every effort to run down these contributary factors and abolish them.

Acknowledgment is made of the valuable assistance rendered by Drs. Pauline R. Kapsa, C. A. Link, Alvin Thompson and F. B. Smith, of Chicago in the accumulation of statistics and material contained herein.

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[1] Wilbur, Cressy L. "Vital Statistics in the United States," Am. Jr. Pub. Health, Dec., 1913, p. 1258.

[2] The Ohio State Board of Health, in the survey of industrial hygiene and occupational diseases which it is now conducting, uses, for workplace investigations, a card 4½ x 7 in. upon which is logically arranged a complete list of the usual health-hazards of industry. By a simple code each is opinionated as "good," "fair" or "bad."

[3] See "Compensation for Industrial Diseases," by E. T. H. Lawes, 1909, Stevens and Sons, London, 306 pp. Also, "Order Extending the Workmen's Compensation Act," Great Britain and Ireland, Bull. Int. Labour Office, 1914, Vol. IX, Nos. 1, 2, pp. 23–24. Also, "Compensation for Occupational Diseases," Ontario, Canada, U. S. P. H. Reports, Aug. 21, 1914, Vol. XXIX, No. 34, p. 2176.

[4] In this connection we may say that the powers of the State Factory Inspection Department, limited as they are to the reports of factory physicians only and then to a certain few poisonous industries, do not permit of aggressive investigations of this sort.

[5] See Bull. Ill. State Dept. of Fact. Inspection, Oct., 1913, and April, 1914, I, 1 and 2.

[6] Several excellent textbooks have recently appeared upon occupational diseases and industrial or vocational hygiene which discuss the various hazards of each calling.

[7] See Symposium on Ventilation, Jr. Indus. and Eng. Chem., March, 1914.

STATISTICAL TREATMENT OF DEATHS OF "NON-RESIDENTS."

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A VAST deal of nonsense has been written on the subject of deaths of nonresidents, chiefly by those who, being utterly ignorant or unscrupulous as to proper statistical methods, are concerned chiefly with the "reduction"—and then the further "reduction"—of their city death-rate so that their claim to dwell in "the healthiest city in the United States" may seem to have some basis of statistical foundation.

Such "authorities" sometimes resort to wholesome elimination of deaths at certain ages or from certain causes and then do not hesitate to compare the juggled figures with the rates for other localities in which the total deaths are employed in accordance with the Rules of Statistical Practice adopted by the American Public Health Association and approved by the United States Bureau of the Census.

It is rare indeed to find that any attempt is made to add deaths of residents occurring elsewhere, although it is very evident that the "nonresidents" deducted must be accounted for somewhere, under any reasonable system of vital statistics; otherwise the attempt at correction simply amounts to an understatement of the death-rate. And unless there is general agreement as to what shall constitute a "nonresident"—and we have not yet reached such agreement—it is evident that many more deaths of this class might be deducted in one city than in another, thus destroying entirely the comparability of the data.

The practical difficulties attending the allocation of nonresident deaths, and the unfair use that will be made of such data unless equitable and precise rules can be framed and followed by all registration offices alike, should not prevent our giving immediate practical attention to the correct treatment of these cases. It would be unwise, however, to undertake an immediate revolution in methods. The settled and thoroughly accepted basis of compilation, namely, the inclusion of all deaths that occur in any given area in the computation of its death-rate, will necessarily remain—at least for some time to come—the only feasible basis for general comparisons. A very considerable portion of our country—in which I am sorry to be obliged to include the state of Florida—is not even yet within the registration area. Deaths of residents of Jacksonville, for example, occurring in the rural part of the state, might not be registered. Exact statistical bookkeeping demands thorough and complete registration of every

birth and death that occurs in every state of the Union. And then, and we may cite the example of England and Wales, with an efficient vital statistics law covering the entire country since 1837, it was not found feasible to procure the complete distribution of nonresident births and deaths until as recently as 1911. Contrast the clamor raised by those, chiefly from localities with utterly worthless or at least woefully deficient registration, *demanding*, perhaps by Act of Congress—as if Congress had ever taken any real interest in vital statistics—that "deaths of nonresidents shall be deducted."

A vast mass of useful mortality statistics has been accumulated by the Census and the registration states in which the total deaths that occurred are taken as the basis of comparison. The Census statistics are undoubtedly trustworthy for the great majority of areas, although undoubtedly an occasional injustice may be done when the balance of immigration is far in favor of the special locality. This would be offset, to some extent, by the unusually favorable age distribution that frequently obtains. Too much reliance, it should be always remembered, should not be placed upon crude death-rates in any case. They are necessary, but chiefly as an indication for further analysis. Hence to exclude "nonresident" deaths, with failure to add deaths of residents that occur elsewhere, and with no allowance for peculiar age constitution of population, may lead to such absurd rates as 5, 6, or 7 per 1,000.

The United States, as we all know, has been far behind the remainder of the civilized world with respect to the registration of vital statistics. It would seem that we might perhaps be content, until we have achieved general and complete registration of vital events throughout the country, with the methods that have thus far appeared practicable. But the present year, in the course of which vital statistics laws have been passed by South Carolina and Georgia, marks the close of what we may consider the first and formative period of American vital statistics. Every state in the Union now has a law of some kind—some of the kinds are wholly bad, unfortunately—for this purpose. We can now improve our laws and develop a higher standard of accomplishment thereunder. So it may be a good time to begin with the separation of nonresident deaths.

For this purpose it is necessary to have exact rules, which should be adopted and enforced as are other Rules of Statistics Practice of this Association. Referring to my discussion of this subject in the Census report on Mortality Statistics, 1912, pp. 13–15, and to the practice of the English Registrar-General's office as cited therein, I venture to suggest, as a basis for discussion:

Proposed Rule No. (a).—A separate compilation shall be made of deaths of nonresidents, corresponding to the main tables of total deaths, so that comparisons can be made and special rates, exclusive of deaths of

nonresidents, can be computed. All such tables and rates shall plainly state that they are exclusive of nonresidents.

Proposed Rule No. (b).—Deaths of nonresidents ("transferable deaths") are deaths of persons who, *having a fixed or usual residence in the [State or United States]*, die in a district other than that in which they resided. The deaths of persons without fixed or usual residence [definite statement of "Former or usual residence" on Standard Certificate], *e. g.* casuals, are not transferable deaths [*Omit:* "except as provided below, (h)," namely, that deaths from violence shall be transferred (a) to district of residence; (b) if residence unknown or no fixed abode, to district where accident occurred; (c) failing this, to district where death occurred; (d) failing this, to district where body was found].

Proposed Rule No. (c).—The basis of distinction of nonresident shall be the (correct and truthful) replies to Items 17 (Cause of death and *Duration*) and 18 (Length of Residence) of the United States Standard Certificate of Death. No deaths of "nonresidents" shall be segregated by city, state, or federal offices in which the data required upon *both* of these items have not been filled out. State registrars should require local registrars to insist that these items be given in full for all nonresidents and advise them that otherwise no exclusions of such deaths will be made.

Note.—The wording of the Standard Certificate in Item 18 is sometimes misunderstood. "At place of death" is frequently interpreted as time at the hospital for residence of the city. Hence I have added, in the latest edition of the New York State death certificates, the explanatory underline "Primary registration district." Doctor Gram of Buffalo asks for Item 18 in all cases, residents as well as nonresidents; this practice is to be commended.

Proposed Rule No. (d.)—Persons dying in institutions for the sick and infirm, such as hospitals, lunatic asylums, workhouses, and nursing homes (but not almshouses) [and almshouses], must be regarded as residents of the district in which they had a fixed or usual residence at the time of admission [commitment]. If the person dying in an institution had no fixed residence at the time of admission, the death is not transferable [not to be included in tables of nonresidents]. If the patient has been directly transferred from one such institution to another, the death is transferable to the district of residence at the time of admission to the *first* institution.

Proposed Rule No. (e).—Deaths of residents of a city in an institution (*e. g.*, almshouse, nursing home, tuberculosis farm) situated outside of the city limits, but chiefly or entirely occupied by commitments from the city, should be included in the total deaths of the city; such deaths should be distributed by the city registrar to the districts of residence as provided by Rule No. 12 adopted in 1908.

Proposed Rule No. (f).—The deaths of infants born and dying within a year of birth in an institution to which the mother was admitted for her confinement should be referred to the district of fixed or usual residence of the parent (mother).

Proposed Rule No. (g).—Births in lying-in institutions shall be transferable to the place of fixed or usual abode, if known, of the mother.

Proposed Rule No. (h).—Deaths from violence are to be referred:

(a) To the district of residence, under the general rule;

(b) If this district is unknown, or the deceased had no fixed abode, to the district where the accident occurred, if known.

(c) Failing this, to the district where death occurred, if known; and

(d) Failing this, to the district where the body was found.

The proposed rules (a to h) are not entirely consistent in themselves, but are presented with a view to bring out discussion and, by a process of elimination, to reduce them to their lowest terms in the way of a practical working basis. A point to be considered is how far such rules will be applicable to the national statistics, with the large proportion of nonregistration territory, and to what additional degree, if any, deaths that occur with a state area can be distributed.

No apology need be made for the presentation of the English rules with a view to their possible adoption. Much more attention has been given in that country to these details of statistical administration than in this, and it would evidently be very desirable that the general methods should be closely in agreement. In neither country, however, has sufficient attention been paid to the requirement of a definite statement of duration of illness, dating from the original onset of the disease. If this information shall be attainable in a large proportion of cases, as contemplated in proposed Rule (b), a simple rule would perhaps prove effective:

Proposed Rule No. (i).—Nonresidents (transferable deaths) are deaths, including those in institutions, in which "Former or usual residence" is given under Item 18 as *other* than the "Place of death" (Item 1), and for which the "length of residence" is stated at is *less* than the duration of the (preferred) cause of death as stated under Item 17.

Whether a definite conclusion be reached at this meeting of the Association or not, I hope, with the approval of the special committee in charge of this subject, to make a practical trial of what seems—after full discussion—to be the most feasible method of treatment; without, however, disturbing the comparability of the data compiled and presented in the State and Census reports for preceding years. For this purpose I have prepared a card which will enable the exact place of residence, as well as of death, to be punched in considerable detail; and plan to punch duplicate cards for all nonresident and institutional deaths so that subsidiary tables can be built up without disturbing the main compilations, which must be based, for the immediate present, upon the well-established and generally sound basis of all deaths that occur.

THE INTERNATIONAL JOINT COMMISSION'S INVESTIGATION OF SEWAGE POLLUTION OF BOUNDARY WATERS.

ALLAN J. MCLAUGHLIN, M. D.,
Commissioner of Health, Commonwealth of Massachusetts.

Read before the Laboratory Section, American Public Health Association, Jacksonville, Fla., November 30-December 4, 1914.

THE following questions regarding the pollution of boundary waters were referred by the governments of the United States and Canada to the International Joint Commission for investigation and report.

1. To what extent and by what causes and by what localities have the boundary waters between the United States and Canada been polluted so as to be injurious to the public health and unfit for domestic or other uses?

2. In what way or manner, whether by the construction and operation of suitable drainage canals or plants at convenient points or otherwise, is it possible and advisable to remedy or prevent the pollution of these waters, and by what means and arrangement can the proper construction or operation of remedial or preventive works, or a system or method of rendering these waters sanitary or suitable for domestic or other uses, be best secured and maintained in order to ensure the adequate protection of development of all interests involved on both sides of the boundary, and to fulfil the obligations undertaken in Article IV of the waterways treaty of January 11, 1909, between the United States and Great Britain, in which it is agreed that the waters therein defined as boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other?

The field work of the Commission aimed to secure data indicating the source, extent and degree of pollution of these waters in such a manner as to enable the Commission to answer the first of the two foregoing questions.

The field investigation covered the examination of the waters of Rainy River, parts of Rainy Lake and Lake of the Woods, that part of Lake Superior known as Thunder Bay, the St. Mary's River from the headwaters in Lake Superior to Mud Lake (including a set of samples through Detour Passage to Mackinac Island), Lower Lake Huron, the St. Clair River, Lake St. Clair, the Detroit River, the western end of Lake Erie, the central portions of Lake Erie (Port Stanley), the eastern end of Lake Erie, the Niagara River, the western portion of Lake Ontario, the eastern end of Lake Ontario, the St. Lawrence River to Cornwall, and that portion of the St. John River in which is the international boundary between the United States and Canada.

SCHEDULE OF WORK PERFORMED.

Date 1913.	Laboratory.	Waterway.	Headquarters.	No. of sample points	Total number samples
July 8–22	Provincial Board of Health, Ontario.	Rainy River.	Fort Frances, Ont.	192	955
July 28. August 15.	" "	Lake Superior (Thunder Bay).	Port Arthur, Ont.	66	922
June 28– July 16.	" "	Lake Superior St. Mary's River.	Sault Ste. Marie, Mich.	104	1,065
July 29. August 25.	" "	Lake Huron, St. Clair, River.	Sarnia, Ont.	142	1,606
September– October 10.	" "	Lake St. Clair, Detroit River.	Windsor, Ont.	174	1,755
September– October 3.	" "	Detroit River, Lake Erie.	Amherstburg, Ont.	114	1,306
October.	" "	Lake Erie, Port Stanley.	Windsor, Ont.	51	214
May 26– June 17.	" "	Lake Erie, Niagara River.	Fort Erie, Ont.	133	1,375
May 27– June 12–	" "	Niagara River.	Niagara-on-the-Lake, Ont.	59	840
April 10– May 23.	" "	Lake Ontario, St. Lawrence River.	Kingston, Ont.	113	928
May 23– August 27.	United States Public Health Service.	St. Clair River, Lake St. Clair, Detroit River, Lake Erie.	Detroit, Mich.	70	1,812
June 12. July 23.	" "	Lake Erie.	U. S. Revenue Cutter *Morrill*	20	480
May 12– July 19–	" "	Lake Erie, Niagara River.	Buffalo, N. Y.	60	1,624
August.	" "	Lake Ontario, St. Lawrence River.	Clayton, N. Y.	32	482
October.	" "	St. John River.	Van Buren, Me.	32	672
July 3– August 13.	Michigan State Board of Health.	Lake Huron, St. Clair River.	Port Huron, Mich.	45	720
August 1– August 21.	New York State Department of Health.	Niagara River, Lake Ontario.	Youngstown, N. Y.	42	338
August.	Provincial Board of Health, Quebec.	St. Lawrence River.	Montreal, Quebec.	8	480

The results of the field work are now in print.*

* Progress Report, International Joint Commission in re The Pollution of Boundary Waters, 1914, Washington, D. C.

Methods and Apparatus.

In a work of such magnitude large incubators were necessary. Modified or adapted chicken incubators costing about $38 were used. They were satisfactory for field work, and a saving of about $200 per incubator was effected.

Several types of deep sampling apparatus were used. The American laboratories used the following: A wooden bottle holder with strong clamps for holding the sample bottle was equipped with a heavy weight and stout rope. This was sunk to the required depth by the rope. The glass stopper could be drawn out one-half inch, permitting the bottle to fill by pulling on a smaller rope. The apparatus for raising the stopper consisted of two prongs fitting under the flange of the stopper attached to a brass rod running perpendicularly in a groove on the bottle holder. The rod was raised by a pull on the smaller rope, and a spring reseated the bottle stopper. The ground-glass stopper ordinarily seated itself one inch in the wide mouth of the bottle. A "stop" on the brass rod prevented raising the stopper more than ½ inch, so that while ample room for filling the bottle was provided, the stopper could not leave the bottle and by reason of the spring must reseat itself upon releasing the small rope.

Indices of Pollution.

Since *B. coli* is absent from unpolluted water, the estimation of this organism is therefore the most specific and best index available for showing the existence and degree of sewage pollution. The bacterial count at 37 degrees C. on agar is nearly specific for intestinal organisms whose optimum growing temperature is that of the human body. The bacterial count at 18 degrees–22 degrees C. is less specific in an investigation to determine sewage pollution, but is valuable nevertheless.

Scope and Technique of Examination.

Samples were taken in wide-mouth glass-stoppered bottles which had been wrapped in paper and sterilized by dry heat at a temperature of not less than 160 degrees C. for one hour. Samples were immediately placed in containers and surrounded by ice. Although icing of the sample may have been unnecessary in some instances, it was deemed wise to make no exceptions and to use ice in transporting samples even when the time of transit to the laboratory was less than two hours.

At a conference in Detroit, it was agreed to use the presumptive test for *B. coli* in lactose bile, and where possible, confirmation tests on Endo plates. By the use of Endo plates the American laboratories were able to show that the index of error using bile media alone is small in the Great Lakes, and that the procedure in the Ontario laboratories of recording *B. coli* from gas production in lactose bile was safe and satisfactory so far as the Great Lakes water was concerned.

Experience on the St. John River, however, shows that until something is known of the flora in the water of a given stream it is unsafe to depend upon the presumptive test alone.

In addition it was agreed to make a count of the total bacteria on agar at 37 degrees C., and whenever possible on agar at 22 degrees C.

It was agreed that the *B. coli* content should be estimated by making dilutions and planting in lactose bile such quantities as 50 cc., 25 cc., 10 cc., 1. cc., .1 cc., .01 cc., and .001 cc., or as many of these as necessary to show both a positive and negative result. The inoculated lactose bile fermentation tubes were incubated for 48 hours at 37 degrees C. The bacterial count was an acutal count of the entire plate, such dilutions being made as to give not more than 200 colonies per plate. The combination of gas in lactose bile and a colon-like colony on the Endo plate, for the purpose of this examination were recorded with a plus sign. The media used and technique of examination was according to the standard methods of the American Public Health Association (Second edition, 1912).

Presentation of Data.

The presentation of the data obtained during this investigation involved the preparation of maps showing the location of the various sampling points, the detailed tabulation showing for each sampling point the average bacterial count per cubic centimetre on agar, *B. coli* per 100 cc. by Phelps method,* the number of samples collected, dates of collection, maximums obtained during the period of examination at each point and some illustrations showing graphically the source, degree and extent of the pollution as indicated by the bacterial findings.

In a work involving the examination of 20,000 samples of water in a period of six months the question of how far to carry the colon test becomes very important. Is the index of error in depending upon the presumptive test in lactose bile alone sufficient to warrant the expenditure of time and labor necessary to carry out the further steps in the complete identification of *B. coli?* We found that in locations where fresh sewage was discharged rather constantly the index of error in using the presumptive test alone was small. Supplementing the presumptive test by plating from the fermentation tube on Endo's media still further reduced the index of error. With a field laboratory examining from 30 to 60 samples daily it is impracticable to carry out the further steps in the identification of *B. coli* without reducing enormously the number of samples examined. Where the samples to be examined are few it is my opinion that the *B. colon* test should be carried out to the limit. In large operations, however, where the maximum number of samples in a minimum of time is required, the waste of time, labor and material necessary to eliminate the small index of error is not justified and it is poor judgment to carry the test beyond the confirmatory test on Endo's plates. I have always believed that this confirmatory control of the presumptive test is essential and our experience on the St. John River confirms this view.

* Phelps, Earle B. A method for calculating the number of *B. coli* from the results of dilution tests. Reports and papers of the American Public Health Association, Vol. 33, 1907, pt. 2, pp. 9-13. Note: This method was most convenient for the purposes of the report.

Fermentation of Lactose Bile by an Anærobic Organism.

In the course of the work on the St. John River an interesting finding was recorded. In the first two or three days of sampling it was evident that the number of organisms producing gas in lactose biles was out of proportion considering the lack of urban pollution (sewage). The tests of tubes showing gas were made on Endo plates and 305 out of 444, or 69 per cent., failed to show colonies which bore any resemblance to the *Colon Bacillus*. Transplants from the lactose bile tubes showing gas always gave on agar slants an ærobic surface growth and a production of gas along the sides of the tube below the surface suggesting an anærobe. The surface growth was sometimes a coccus, sometimes *B. subtilis*, and sometimes other ærobic organisms.

If the mixed culture of an agar plant was inoculated into hot agar and *B. subtilis* or other resistant organism accompanied the anærobe, the result was a surface growth of *B. subtilis* and a production of gas bubbles in the depths of the media. Pure culture of this anærobe can be obtained from the mixed culture by making dilutions and finally drawing the hot agar up in a long glass pipette. The bubbles form at intervals, and after selecting one apparently discrete, the glass is broken under sterile precautions and inoculation made from the walls of the bubble. Morphologically it is a spore bearing anærobe resembling and possibly identical with *B. Welchii*. It gave the typical reaction of *B. Welchii* in rabbits. Further work will show whether the two organisms are identical or merely related.

The question arises, Whence comes this considerable pollution with an organism resembling *B. Welchii*? It has been asserted that this organism is the only one outside of the colon group which ferments lactose bile, and that it is derived from the intestines of animals. We found nothing to suggest that the first statement is untrue, but the second statement, in our opinion, is open to question. More work will have to be done to show whether the intestine of man or animals is the habitat of *B. Welchii* or that their presence there is accidental. If its habitat is the soil, the question at once arises, Does it reach the soil from the manure spread over the fields?

The experience clearly shows that the presumptive test (gas in lactose bile) alone for *B. coli*, may be misleading and that some confirmatory test is necessary in certain waters. In this work Endo plates were used to confirm presence of *B. coli* in tubes showing gas.

It is very probable that a group of anærobic organisms of which *B. Welchii* is a type is much more widely distributed in our surface waters than is generally supposed. Where sewage pollution is gross the finding of *B. coli* is conclusive and obscures the presence of other factors in the gas production. If material from the gas tubes were transplanted into hot agar it is probable that in many instances this anærobe would be found.

PHYSICAL EXAMINATION OF EMPLOYEES ENGAGED IN THE MANUFACTURE OF PORTLAND CEMENT.

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Riverside, California.

Read before the Section of Vital Statistics, American Public Health Association, Jacksonville, Fla., November 30–December 4, 1914.

IN THE past, investigation of the effect of cement dust on workers in cement mills has been apparently neglected, and there are few published references or documents concerning this field of industrial hygiene. Therefore, as a preface to this paper, I wish to briefly call your attention to the history of the industry, to give you a very limited description of the process of manufacture, and to quote briefly from the main authorities who have published their observations concerning the cement industry.

The form of cement which is now generally used is called Portland cement and was first sold in the open market of the United States in 1892, but for many years prior, a product known as natural or Rosedale cement was used for building purposes.

The first Portland cement plants were crude in construction as compared with the modern mills. The buildings, bins, elevators and casings were of wood and the cracking and shrinking of the material allowed the fine cement dust to escape in every direction. Now iron and steel have been largely substituted, with a resulting dimunition of the escaping dust.

Portland cement is made from materials which differ widely in outward appearances but are practically the same from the standpoint of chemical analysis.

A typical analysis of the raw mix, or crude material which enters into the composition of cement would be as follows:

Silica	15.18
Iron alumina oxide	5.06
Calcium carbonate	76.34
Magnesium carbonate	2.90
Undetermined	.52

While a finished cement shows the following analysis:

Silica	22.98
Iron alumina oxide	8.80
Lime	63.10
Magnesium oxide	2.42
Sulphuric anhydride	1.42
Loss on ignition	.52
Undetermined	.69

On the Pacific coast the cement mills use a high grade lime rock, which is reduced to the proper proportions with a clay material, consisting almost entirely of silica, iron and alumina. These materials are quarried in the usual way and brought into the mill, pass through gyratory crushers which reduce them in size to three inches and under. From this point they are passed through rotary dryers to drive off any excess moisture before grinding.

The grinding process then reduces the size so that 94 to 96 per cent. of the material will pass through a 100 mesh sieve before burning.

This material is then carried to the kilns where it is burned to the point of incipient fusion, at a temperature of about 1200 to 1500 degrees centigrade, the resulting masses being known as "clinker."

The clinker is carried outside of the mill by means of conveyors, where it is allowed to cool or age, is later brought back into the mill and approximately 3 per cent. of gypsum is added. The addition of this gypsum is merely to regulate the setting time of the cement. This material, ground again through the same type of mill, produces the finished product. Cement is so finely ground that 95 to 97 per cent. will pass a 100 mesh sieve and 80 to 84 per cent. pass a 200 mesh sieve. It is then stored in bins from which it is drawn and conveyed to the packing department and packed by automatic machinery.

It will be noted that from the beginning of the process of the manufacture until the finished product is completed, dust is the end desired.

Referring now to published reports, one eminent writer has said that "in general, observations and statistical data go to show that exposure to mineral dust has health-injurious effects and such effects reveal themselves in the general high death-rate."

Nevertheless, cement as a mineral dust differs from others in this group inasmuch as cement dust is a finely ground, non-irritating powder and contains no grit or germs. It has the property of setting and forming a solid mass in the presence of moisture and because of this property very little, if any, of it reaches the lungs through the respiratory tract. "There are no irregular and jagged particles that might bring about irritation of the pulmonary mucous membranes and so predispose these delicate tissues to microbic attack. Nor can it be said that the dust is noxious by reason of its chemical properties."

In the annual report of the Chief Inspector of Factories for Great Britain, for 1911, Mr. Sidney Smith, H. M. Inspector for Dangerous Trades, stated that, "Careful inquiry has been made as to the effects of dust on the health of the workers. Sick clubs exist in a number of the factories and particulars as to mortality, invalidity and sick pay appear to show that the trade is on the whole a healthy one. Deaths are few, absences from work rare and generally due to influenza, colds or accidents, and sick pay is small.

There is often more invalidity among the workers in non-dusty processes than in the dusty occupations of kiln drawing, milling and packing."

A comparison of the death-rate among men employed in the several occupations in which there is more or less exposure to mineral dust, with the death-rate per thousand from all causes in all occupied males, shows that in the former the death-rate is 14.56 per cent., while in the latter it is 15.16 per cent. In England and Wales the mortality from consumption among men in occupations where there was exposure to mineral dust, was somewhat lower than for occupied males in general. Between the ages of 35 to 64, the death-rate among those employed with exposure to mineral dust was decidedly excessive.

The smallest percentage of deaths due to consumption in these dusty occupations, by groups, is in the group of occupations with exposure to vegetable fibre dust, and the second smallest percentage of deaths due to consumption is among men employed in occupations with exposure to mineral dust.

Unfortunately, in considering this high death-rate from consumption and other respiratory diseases, the subject of housing conditions among workmen and living conditions in general, had not been investigated and their influence is not revealed in these tables. Further, the report of the investigation does not indicate wherein ventilation and general insanitary conditions exist and their influence upon the death-rate. Writers of authority upon this subject emphasize the importance of adequate ventilation, and dust reduction, and the report of the English Departmental Committee, appointed to inquire into the ventilation of factories and workshops, published in 1902 and 1907, warrants the conclusion that "effective ventilation of factories and workshops and the artificial removal of dust at the point of origin is entirely practicable and possible at moderate expense."

Adequate ventilation in cement mills is carried out to an ideal degree, because of the fact that two sides, and oftentimes three, are nearly always open. Inasmuch as the modern kilns release no impurities, and since in no department is the occupation sedentary in character, there is no objection on the part of the employees to proper ventilation. In California, where moderate weather prevails the year round, the problem of ventilation is a minor one.

The greatest number of men employed in the industry are engaged in the quarrying of the raw material. Outside of the packing room and the sack cleaning room, there is no department in which cement dust escapes into the atmosphere in any appreciable quantities.

In the packing department, at the present time, a small number of men are required, and the use of the mechanical automatic type of packer reduces the quantity of cement dust which escapes into the atmosphere to a

negligible minimum. The recent installation of a dust-proof sack cleaning machine in the Riverside plant has, to all intents and purposes, overcome the dust problem in this department.

Observations on the effects of cement dust in the past have been made where the old method of packing and cleaning was still in vogue.

A footnote reference made on page 711 of the Bulletin of the Bureau of Labor is here quoted:

"(a) How widely qualified opinions differ with regards to the health-injurious effects of mineral dust derived from lime and cement is made evident by the following quotation from the *Journal of the American Medical Association*, December 12, 1908:

" 'Selkirk has investigated a general opinion among lime workers that they are exceptionally free from bronchitis and pulmonary tuberculosis. He was unable to find an instance of phthisis among them, nor could he learn on inquiry, of any worker in limekilns having died from tuberculosis. He asks whether those who inhale and swallow much lime are abnormally free from tuberculosis of the lungs. He discusses what is known of the therapeutics of calcium salts, and says that it appears that the continued absorption of calcium from the lungs and intestines might maintain an abnormally high percentage of it in the blood. He suggests that the workingmen predisposed to tuberculosis might turn his attention to lime and cement working as an occupation, and even hints at the organization of lime works as a curative tuberculosis colony. A rapid increase of weight is commonly observed in new workers at the Warren Cement Works at Hartelpool.' "

And I would further quote: "Prof. K. B. Kehmann of Würzburg" and his associates, with a view to preventive and palliative measures to be applied to industries, have sought more precise information regarding the ways by which dust permeates the body, as well as the actual quantities which represent dangerous insanitary limits. These investigations have demonstrated that most inspired dust finds its way into the stomach, not into the lungs. Most of the dust which enters the upper respiratory tract is caught by the moist mucous membranes of the nose and throat, and the dust-laden secretion is then swallowed.

"In the case of insoluble particles the gastro-intestinal path may furnish a most satisfactory channel for the subsequent elimination of the dust from the body, but soluble dust finds a peculiarly favorable chance for absorption along the same route, and the opportunity for chronic intoxications is thus easily established. In any event, the lungs escape the major part of the initial irritation."

It would appear that since the principal ingredient of cement is lime in the form of calcium oxide, that undoubtedly this material would meet with the same fate in the stomach as lime water, and since a very great propor-

tion of our infants have a very appreciable quantity of lime water added to their diet without injurious effects, it would be desirable to know by what line of reasoning calcium oxide from cement would have a different effect from calcium oxide from lime water. The hydrochloric acid of the stomach would undoubtedly be able to convert the oxide into the chloride and this material can be ingested in large quantities over long periods of time apparently without ill effects.

Laboratory tests show that 99.7 per cent. of $^{5}/_{10}$ of a gram of cement is soluble in 500 cc. of a $^{1}/_{10}$ per cent. solution of hydrochloric acid, and 99.7 per cent. of $^{5}/_{10}$ gram of cement is soluble in 250 cc. of a $^{2}/_{10}$ per cent. solution. The average per cent. of hydrochloric acid varies from $^{1}/_{10}$ to $^{2}/_{10}$ per cent. in the gastric juices of the normal stomach.

Similar experiments conducted in the laboratory, using the so-called treater dust, or dust which escapes from the stacks of the kilns heated to 800 degrees centigrade showed that 81.44 per cent. of $^{5}/_{10}$ of a gram was soluble in 100 cc. of a $^{1}/_{10}$ per cent. solution of hydrochloric acid. This solution became neutral when reaction was complete.

The partially burned, or treater dust, however, is not present in the dusty parts of the mill, and its effect should not be considered because of its absence from the various departments.

If the limited amount of dust which escapes in the packing and sacking departments in these modern mills is sufficient to cause deleterious effects upon the respiratory organs of the men employed, it would seem by analogy with the effects in other dusty trades, that the hospital records of these various mills would show an unusual number of cases of pulmonary tuberculosis.

However, the hospital records of the various mills do not present any evidences of tuberculosis having been acquired by employees and an investigation of four of the largest county hospitals located in the vicinities of the various plants, namely, San Francisco, Sacramento, Los Angeles and San Bernardino, conducted in March 1913, showed that of 471 patients in the tuberculosis hospital at San Francisco, including a list of those who had been discharged and those who had died, only three of this number gave as occupation, cement worker.

The occupation of cement worker was among those forming less than 1 per cent.

From a total of 955 cases investigated in the Sacramento County Hospital, there were no patients giving occupation as cement worker.

In the Los Angeles County Hospital, of 1,449 cases of tuberculosis investigated, 9 patients gave their occupation as cement workers and the occupation of cement worker was among those forming less than 1 per cent.

The San Bernardino County Hospital records, including the years from 1891 to 1913, representing a total of 722 cases, showed that there were no

patients giving their occupation as that of cement worker, although there is a large cement mill located in the county about three miles distant from the hospital.

In a letter from Mr. Frederick L. Hoffman, Statistician for the Prudential Life Insurance Company, to Dr. W. F. Snow, former Secretary of the California State Board of Health, Mr. Hoffman stated: "The evidence of medical men," referring to the investigation of the effects of dust in the cement plants, "and others, is generally negative. Pulmonary complaints, phthisis and asthma, appear to be conspicuously absent. There is no evidence of life being shortened, but on the contrary, the longevity of cement workers is remarkable, men being frequently found at work at the age of 60 years and upwards."

Mr. Hoffman further stated that "The inhalation of dust must cause a great deal of discomfort and probably the injurious effects on the system are greater than are at present recognized."

It has been thought that since the investigation of tuberculosis hospitals and the medical evidence has shown that cement workers were comparatively free from pulmonary tuberculosis that it might be possible to determine to what extent they suffered from nasal and pathological throat conditions as a result of employment in departments where there was more or less of cement dust, and with that in mind, Dr. W. E. Stevens, a nose and throat specialist of San Francisco, made an examination of eighty men, a chosen twenty from each of four mills. "The factors in the selection of subjects were the length of time employed and the department of work."

"The departments where the workers encounter the greatest quantity of dust are the grinding mill, the packing or sack house, and the sack cleaning house. The majority were selected from these departments from among men who had been employed in cement work for four years or more."

The findings in general were that in 85 per cent. there was a deposit of cement dust in varying quantities fairly uniformly located on the middle portion of the septum and anterior ends of the middle turbinates. The dust was easily removed showing a normal membrane except in three cases, in two of which there was a small superficial ulcer of the septum and in one a large perforation of the septum, apparently of long standing.

In 20 per cent. there were deflected septa.

In 5 per cent. enlarged tonsils.

In 5 per cent. a slight catarrhal inflammation of the larynx.

In 28 per cent. a slight inflammation of the naso-pharynx, with an excessive catarrhal secretion.

In 40 per cent. a catarrhal inflammation of the pharynx.

"The conclusions from the examination were that the membrane of the nose seems to exercise its complete function and eliminate the dust from the inhaled air. The cement dust being practically sterile and chem-

ically non-irritating, there is very little inflammation caused by its presence in the nose.

"It is fair to state here that catarrhal inflammation of the throat is very prevalent on this coast, and a large per cent. of people will show an inflammation of the throat with an excessive secretion.

"Almost all the men were asked if they had any symptoms referable to the nose or throat. In two instances there had been a sore throat, otherwise they had no subjective symptoms.

"The average time of employment in cement manufacture was four and one-half years. The length of time employed apparently had no influence on the conditions found, as the foregoing detailed report will show."

During the year three experiments with guinea pigs have been conducted in the Riverside Plant, one of which is not as yet completed.

Twelve pigs were exposed continuously to dust for a period of three weeks, night and day.

Six pigs were kept as a control outside the plant.

The result of the autopsy of these 18 guinea pigs was negative. There were no concretions in the nose, throat, lungs or intestinal tract.

Later 10 guinea pigs were exposed to dust in two departments of the mill on shifts, two weeks twelve hours during the day and for two weeks twelve hours during the night, for a total period of four months.

Five pigs in one department gained 1,530 grams, or an average of 306 grams each.

Five pigs in another department gained 1,020 grams, or an average of 204 grams each.

Macroscopical and microscopical investigation of all the viscera of these pigs was negative. X-ray pictures of the pigs were negative.

Among the first pigs exposed two developed concretions over the cornea, completely filling the conjunctivas, holding the eyelids open. These concretions remained for twenty-four hours, when they disappeared without treatment, leaving perfectly normal corneas and conjunctivas.

Three groups of guinea pigs were exposed to dust in three different departments on working shift hours for two months. They were inoculated with known quantities of tubercle bacilli emulsion. The guinea pigs previously exposed were again placed in dusty departments of the plant for exposure during working hours and the rapidity of death and results of autopsies will be noted.

Eight guinea pigs unexposed to dust used as controls, were inoculated at the same time as the above and two of this number have already gone to autopsy.

In October 1913, the Riverside Portland Cement Company inaugurated a complete system of physical examination of all employees, with the view of making an investigation of effects of employment in the various de-

partments of the industry upon the health of the men, and with the further purpose of reducing the accident hazard in the various departments by selection of risks.

The system in brief employed in the medical department consists of a complete physical examination of all employees and applicants for employment, annual reëxamination of employees, a complete medical record of all cases of illness occurring among the men and a similar record of all cases of injury from accidents. Applicants for employment must be examined prior to assignment to duty.

An employee, when ill, notifies his foreman, who sends him to the time office, where a slip giving age, number, department, length of time employed is written, a copy sent with the patient to the doctor for his record and a duplicate kept on file in the time office. Three physicians are available to the men for treatment, but the assignment is made to one of the staff.

Hospital cases are cared for in the city hospital, medical records, including physical examination and treatment, are recorded by the physician and upon recovery from illness, the employee is given a "return to work slip" signed by the physician. Such employee cannot return to work except upon the presentation of this slip.

The data which I now wish to present to this body has been gathered from the records of 1,500 physical examinations, covering a period of one year. Of this number 956 were employees and 544 applicants for employment.

Among the employees the total number classified was as follows:

First class	427	or 44.65 per cent.
Fair	364	or 38.07 per cent.
Doubtful	96	or 10.04 per cent.
Bad	69	or 7.20 per cent.

Among the applicants the classification of risks was as follows:

First class	330	or 60.66 per cent.
Fair	158	or 29.04 per cent.
Doubtful	14	or 2.59 per cent.
Bad	42	or 7.72 per cent.

Among the employees twenty-seven nationalities were represented, of which there were:

Mexicans	282
Americans	248
Armenians	223
Italians	63
Austrians	39
Hungarians	29

The Armenians showed the highest per cent. of married employees, the Americans the second highest and the Mexicans third.

Of the Armenians 115 stated that they used liquor in sufficient quantities to be worthy of mention, 108 used no liquor.

Of the Americans, but 54 of 248 admitted the use of liquor in any appreciable quantity, whereas,

188 Mexicans out of 282 admitted its use;

38 of 62 Italians used quantities of liquor, and

24 of 29 Hungarians,

33 of 39 Austrians.

Among the 956 employees examined there were 99 admission of gonorrhea, but five admitted having had syphilis. Of the cases of gonorrhea, there were;

42 Americans,

29 Mexicans,

2 Armenians.

There were 30 cases of hernia, or a ration of 1 to 50;

There were 64 cases of epitrochlear adenopathy, or a ratio of 1 to 23; 100 cases of enlarged tonsils, or a ratio of 1 to 15;

6 cases gave history of having had appendicitis;

There were 150 cases of faulty heart, or a ratio of 1 to 10;

15 cases of amputation of one or more fingers;

2 cases of amputation of toes;

12 cases of improper flexion and impaired function of joints;

8 cases of deformed fingers;

1 case of deformed forearm;

2 cases of deformed chest;

1 case of deformed elbow;

4 cases of deformed shoulder;

2 cases of deformed ankle;

Total ratio of deformities 1 to 33.

18 men were deaf in one ear;

13 partially deaf in both ears, or ration of 1 to 45.

214 of the total number of employees and applicants gave history of having had smallpox;

677 of having been successfully vaccinated, or nearly 50 per cent.

Of the employed men the following was the

Average age	31 yrs. 8 mos.
Average weight	$149\frac{3}{4}$ pounds.
Average height	5 ft. $6\frac{1}{4}$ in.

The table for average height and weight for 30 years of age in insurance tables indicates that for 5 ft. 6 in. the average weight is 145 pounds.

Among the applicants for employment the following was the

Average age	31 yrs. 6 mos.
Average weight	149 1/6 pounds.
Average height	5 ft. 6 in.

It should be understood that the men called "employees" were not selected risks and underwent no physical examination prior to employment, nevertheless the average weight of employed men was the same as the average weight of the applicants for employment.

The average age of employees in packing house was 29 yrs. 4 mos. 23 ds.

The average weight	153 1/3 pounds.
The average height	5 ft. 6 1/2 in.

The average weight of men employed in the packing department was about four pounds more than the average weight of all men employed. This is based on the examination of 73 men who had been employed an average of more than two years.

In the dusty parts of the mill figures show an

Average age of	31 yrs. 6 mos.
Average weight	162 pounds.
Average height	5 ft. 6 3/4 in.

This is an average weight 13 pounds more than general average, and is based upon the examination of 106 men employed for more than an average of two years.

The nationalities in the packing department were as follows:

Italians	22
Armenians	17
Austrians	14
Mexicans	9
Americans	8

The nationalities in the mill were as follows:

Italians	19
Armenians	22
Austrians	13
Mexicans	14
Americans	21
Hungarians	9

It should be noted that the ratio by nationalities in the mill is practically the same as the ratio of all employees. In the packing house, however, the larger number of Italians and the comparatively smaller number of Americans change the ratio somewhat.

Among the employees there were 16 cases of suspected tuberculosis and but two had worked in any dusty part of the mill. Their employment covered a period of 1 and 10 days respectively. The others had worked either in the quarry or yard, departments in which there could be no contact with cement dust, and the average length of employment was $4^1/_2$ months. Seven applicants for employment had physical signs indicative of previous tuberculosis.

The average blood pressure among employed men in the sitting position, was—

	Systolic.	Diastolic.	Pulse.
Right arm	121.9	74.04	47.50
Left arm	122.75	75.93	46.82
Among applicants:			
Right arm	125.68	76.1	49.58
Left arm	125.88	76.2	49.68

Comparative blood pressures by age groups are available, but not included in this report because of previous detailed data.

The nineteenth session of the California State Legislature passed a Workmen's Compensation Act, and all the industries of the state have been operating since January 1, 1914, under the provisions of this Act. The hazard in connection with the manufacture of cement presumably is such as to warrant the Board of Insurance Underwriters to agree upon a rate of 5.7 per cent. of the payroll as a premium for a policy covering the risks in conformity to provisions of the present Workmen's Compensation Act. In our plant such a premium would amount to $2,736.00 a month. As a result of the installation of modern safety appliances, and an intense educational campaign, together with a selection of risks, the amount of compensation paid out to date for ten months and twenty-five days has amounted to $709.96, a result well worthy of mention.

The effect of the selection of risks on the reduction of accidents justifies the continuation of the physical examination and reëxamination of employees from both a humanitarian and financial standpoint.

A study of the hospital records for eleven months shows that there have been 539 cases of illness coming from an average monthly payroll of 671 men. The average loss of time from illness was less than two days and one-third of the cases were from among men employed in outdoor work in the quarries. One-sixth were from the mill and an almost equal number from the packing and sack-cleaning departments.

21.5 per cent. complained of digestive disturbances. 80 per cent. of these were diagnosed as constipation.

14.47 per cent. complained of colds.

14.47 per cent. neuralgia.

1.00 per cent. nasal disturbances.
4.00 per cent. eyes.
5.00 per cent. throat.

In conclusion, as a result of an investigation of the dust problem in conjunction with the manufacture of Portland cement, based upon the review of literature on the subject, the examination of 956 employees in one plant, examinations of men employed in the dusty departments of four other mills, the medical records of employees and guinea pig experimentation, there appears to me to be no evidence of injurious effects from cement dust upon employees engaged in its manufacture. The reëxamination of all employees and the continuation of the records will give us information of more value, and annual reports of the results of the work at the Riverside Portland Cement Plant will be available to any one interested in this most important phase of the cement industry.

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THE USE OF COMPLEMENT FIXATION REACTIONS IN A PUBLIC HEALTH DIAGNOSTIC LABORATORY.

A. McNEIL, M. D.,
New York City Department of Health.

Read before the Laboratory Section, American Public Health Association, Jacksonville, Fla., November 30–December 4, 1914.

THE application of the complement fixation test to the routine work that comes within the scope of a Health Department Diagnostic Laboratory, has been found reliable only in the diagnosis of syphilis, gonorrheal affections, and glanders. Much research work is being carried on, however, to make this test available in the diagnosis of streptococcal and various other bacterial affections, but at the present time, the wide discrepancies in the results obtained have made it impractical for routine work excepting in the three diseases previously mentioned.

Experience has shown that in the preparation of bacterial antigens no one method is applicable to all varieties of organisms, but each separate group of bacteria seems to require a different method of procedure to produce a successful antigen.

The composition and reaction of the culture medium used in growing bacteria for the preparation of antigens is a matter of the utmost importance. Experimental work would seem to show that antigens of much greater specificity may be obtained from cultures that have been grown on laboratory media for a considerable period of time, than from recently isolated cultures. In complement fixation tests as performed in the New York City Department of Health Serological Laboratory, the proportions of the various reagents used in the original Wassermann test have been adhered to, but the total amount of the contents of each tube has been reduced from .5 ccm. to .5 ccm. This modification makes it possible to perform the tests with a very small amount of serum and also materially reduces the running expenses of the laboratory without in any way interfering with the accuracy of the tests.

The New York City Health Department Laboratory saves several thousand dollars a year on guinea pigs alone by using this modification.

The anti-sheep hæmolytic system and serum inactivated at 56°C. for thirty minutes are used in all complement fixation tests. The same technique is used in the application of the test to the diagnosis of syphilis, gonorrhea and glanders.

Comparative tests have shown that a considerable increase in the number of positive results may be obtained by fixing complement at ice-box tem-

perature instead of the usual 37°C. In the syphilis tests 4 hours at ice-box temperature is the optimum period, while in the tests for gonorrhea and glanders 6 hours gives the best results. This modification does not render the tests too sensitive. In the complement fixation test for gonorrhea, comparative tests between the fixing of complement at ice-box temperature and at 37°C. were made on the bloods of 466 inmates of a state reformatory for women. The ice-box method showed a considerable increase in the number of positive results over fixation at 37°C. As practically all of these women were prostitutes, the total of 65 per cent. of positive results obtained does not seem too high. Vaginal smears were also made from all of these women, only five of which were positive.

In glanders a considerable increase in the number of positive results is obtained with ice-box fixation. This increase is largely confined to cases of farcy, which are frequently missed when fixation at 37°C. is used.

A very interesting series of comparative tests between ice-box fixation of complement and fixation at 37° in the glanders test, was carried out by immunizing eight healthy horses with glanders vaccine. The blood of these horses by fixation at 37°C. was strongly positive for 8 weeks, becoming negative in about 12 weeks, while with the ice-box fixation they continued to give strongly positive results for 14 weeks, becoming negative in about 16 weeks.

At the same time it was ascertained that the blood of horses injected subcutaneously with mallein will react positively for a period of six weeks. Therefore this test is useless where horses have recently been malleined or injected with vaccines.

The antigen used in the syphilis test is a crude alcoholic extract of guinea pig's heart, while in the gonorrhea and glanders tests aqueous extracts that have been passed through a Berkefeld filter are used.

To ensure accuracy all complement fixation tests are made in sets of twelve, each set having a complete series of controls, and each test being performed in duplicate.

All reagents used are carefully titrated and standardized every morning before commencing tests.

Since the Serological Laboratory of the New York City Board of Health was officially established on May 1, 1912, following a resolution making venereal diseases reportable, 55,891 blood specimens have been tested for syphilis, giving 20,279 positive, 27,038 negative, and 8,574 doubtful results.

These specimens have been received from more than three thousand physicians, from city and state penal institutions and from hospitals and dispensaries.

At the present time blood specimens to be tested for syphilis are being received at the Laboratory at the rate of about 2,000 a week or over 100,000 a year.

Since May 1, 1912, 11,672 specimens of blood have been tested for gonorrhea, giving 2,274 positive, 5,675 negative, and 3,723 doubtful results.

As long as gonorrhea is confined to anterior urethra in males or to the vagina in adult females, positive results are never obtained, but shortly after the posterior urethra in the male or the cervix in the female becomes infected, positive results may be obtained.

The test becomes negative in about six to eight weeks after a cure has been effected.

Since May 1, 1912, 9,351 specimens of horse blood have been tested for glanders, giving 1,570 positive, 4,401 negative, and 3,380 doubtful results.

Positive results are obtained very early in this disease and complete fixation of complement means that gross lesions will almost invariably be found on autopsy.

After having made over 75,000 complement fixation tests since the Serological Laboratory was established, it seems safe to assume that in a properly performed test, using freshly standardized reagents, that while a negative result does not exclude the possibility of infection, a positive result may be accepted as evidence of infection.

A doubtful reaction in the syphilis test is without significance excepting in old treated and in very recent cases. In gonorrheal and glanders tests doubtful reactions should be considered as negatives, excepting in glanders where horses are known to have been exposed. A single negative result should never be taken as final where the slightest suspicion of infection exists.

Book Reviews.

American Sewerage Practice. *By Leonard Metcalf and Harrison P. Eddy. Vol. I, Design of Sewers, pp. X–747 illustrated, $5.00. Vol. II, Construction of Sewers, pp. X–564, illustrated, $4.00. McGraw-Hill Book Co., New York and London, 1914–1915.*

The appearance of the first two volumes of Metcalf & Eddy's "American Sewerage Practice" (to be completed in a third volume on The Disposal of Sewage) marks an event in American engineering literature. The prominence of the authors in that branch of engineering which they represent, and the extensive labor of preparation suggested at once by the size of these volumes, assures the reader, in advance, of a work of more than usual interest. Careful perusal of these thirteen hundred pages, moreover, gives evidence that this space has been needed for the proper presentation of the subject and that there has been gathered together in these volumes a digest of material which, in extent, detail and manner of presentation, has never before been equalled in an American work upon this subject.

The first volume on the Design of Sewers, after an introductory historical chapter and a chapter on the general arrangement of sewerage systems, takes up in turn and in logical sequence, the various factors entering into design. The chapters on hydraulics are especially well done and comprise in short space a clear discussion of a difficult topic. Questions of quantity of sewage, precipitation and storm flows are treated fully and satisfactorily. When practices diverge, the authors broadly present the various methods of solution and are noticeably free from dogmatic statements, although attempting to harmonize these variations whenever possible. The remainder of the volume deals with actual design, from the strength of sewer pipe to the analysis of masonry arches and from catch basins and ventilation to pumping stations.

The second volume on construction is equally detailed and draws even more largely upon the experience of the authors. The contractor no less than the construction engineer will find here much that is of permanent value both as to methods and to costs. From preliminary borings and engineering organization, through excavation, sheeting and trenching, and construction of pipe, brick and concrete sewers, down to operation, maintenance and costs, nothing seems have been overlooked. Excavation problems receive especial attention and the treatment is especially detailed, even down to a discussion of the shape and treatment of drill bits. Specimen contract, specification and cost sheets are given and the final chapter deals with explosives and gasoline traps. The authors express their debt to their junior partners and staff for assistance in the preparation of this work.

True to its title it is a compendium of the best American sewerage practice, carefully analyzed in the light of a broad personal experience and illustrated by practical examples carefully worked out and explained. The incompetent engineer will miss the comforting *ipse dixit* of the school text-book, but the student will find the best material prepared here for his use together with all the assistance that any author could give him to work out his particular problem to a sound conclusion.

Earle B. Phelps,
Washington, D. C.

How to Diagnose Smallpox. *By W. McC. Wanklyn. Longmans Green & Co., New York and London.*

The brevity of this book is not the least of its merits. It is a practical little volume, which should prove of value to physicians whose personal experiences have been limited to the more severe types of smallpox that formerly prevailed, as well as to physicians without any personal experience whatsoever in the diagnosis of this disease. Much information contained in it is not found in the ordinary text-book or treatise on the practice of medicine, and it is just such information as the practitioner needs to help him in a doubtful case, especially when expert advice

is not at hand. The writer well emphasizes the importance of mild cases and the difficulty of diagnosing them. The points of differentiation stated by him are probably as safe guides as can be found outside of actual personal experience or the assistance of one who has had such experience.

This book can be highly commended to those whose official duties or private professional work makes it incumbent upon them promptly and certainly to recognize cases of smallpox.

Wm. C. Woodward, M. D.

A Survey of Industrial Health-Hazards and Occupational Diseases in Ohio. (*Columbus, Ohio, State Board of Health, 1915, pp. 438; 101; Illustrations.*)

This is a most instructive and interesting account of an investigation authorized by the legislature of Ohio to determine the causes and conditions of illness and disease among employees in various trades and occupations in Ohio. The investigation was conducted for the State Board of Health by Dr. Emery R. Hayhurst with nine principal investigators.

The report designates the chief industries and processes and defines the principles of the study of their effect upon health. It does not touch upon industrial accidents or their prevention.

The especial feature of the report is the declaration and definition by Doctor Hayhurst of about a dozen so-called "health hazards" applicable to all the industries. Hayhurst points out the fact that it is the business of the factory inspector to connect these health hazards with disease and deaths. "The misconception of the ability of persons to become accustomed to health hazards," he says, "is responsible for a large percentage of the preventable sickness and mortality, *e. g.*, tuberculosis, cancer, rheumatism, anemia, alcoholism, nervous diseases, organic heart disease, circulatory diseases, lung diseases other than tuberculosis, Bright's disease, skin diseases and external causes." "In Ohio in 1912 over 1/6 of all deaths were due to circulatory diseases and 1/8 of all deaths to organic heart disease alone. As a cause of death tuberculosis has been almost doubly outstripped by these chronic degenerative diseases, 58 per cent. of which have occurred before 70 years of age, and 20 per cent. of which have occurred before 50 years of age." The list of industrial health hazards comprises dust, dirt, dampness, darkness, devitalizing air, temperature, fatigue, inactivity, infections and poisons.

The investigation disclosed some twelve hundred cases of positive occupational diseases or disabilities, including cases of lead poisoning, brass chills, skin affections, benzine and benzole poisoning, and tuberculosis.

An important constructive feature of the report is a description under each process of the corrective measures designed to meet the hazardous conditions.

Doctor Hayhurst is to be congratulated for his insistence upon the point that accepted standards should be defined and adopted for all industrial processes and conditions in order to give a definite relationship between the generally recognized health-hazards and all diseases or disabilities.

The index contains special lists covering the forms of occupational dusts, complaints, diseases and poisons reported as hazards.

The report includes a chapter on lead poisoning by the author; one on the Standardization of a method for the Detection of Lead in the Urine, by Charles R. Parkinson; and one by the author and Professor Ernest Scott on Four Cases of Sudden Death in a Silo.

The report is stimulating and helpful to persons interested in furthering the study of the prevention of occupational diseases and injurious influences, and its valuable and unique features place it among the scholarly monographs and works on the subject.

Wm. C. Hanson, M. D.

Health Department Reports and Notes.

REPORTS

Brockton, Massachusetts.

The annual report for 1914 of the city health department of Brockton, Mass., states that this city with a population of 65,286 has maintained for years the lowest infant mortality rate of all Massachusetts cities and has recently been made the subject of a detailed survey by the Children's Bureau of the United States Department of Labor.

The good points of the report are numerous: the population statistics are complete and show the basis of the estimates made; the financial statement is well subdivided and detailed enough to give an accurate idea of the relative costs of the various phases of the department's activities; the tables given are simple and easy to interpret; the illustrations are adequate and well chosen. The cut showing the plan of the municipal laboratory, which is one of the best in the state, is unique and interesting.

According to the Massachusetts system the Health Department appropriation proper and that for contagious diseases are separated. $28.724 was spent for the former and $14.936 for the latter. The School Inspection Department has done good work but more adequate inspection is planned for next year, if possible there will be one doctor for each school each morning. Compulsory vaccination of all school children who do not have a certificate of immunity from a competent physician is rigidly enforced.

During the past year $2.00 has been charged for each Wasserman test, but the laboratory advises that the work be placed upon a free basis for the coming year in order that more use may be made of this valuable reaction.

A clean milk contest has been run during the past year, and an illustration of the dairy maintaining the lowest bacterial count is shown. The equipment is very simple and illustrates the now well recognized fact that it is not necessary for a dairy to have a high score to produce a high grade milk. The record maintained by the winner was an average count of less than 10,000 bacteria per cc. for the entire year.

The vital statistics given in the report are excellent.

NOTES.

An Unique Lunch Room.—The Department of Health of New York City has opened an educational lunch room for its employees at the headquarters of the Department. The object of this is primarily to provide a wholesome luncheon at cost price; secondarily, we expect to educate the patrons in the subject of food and nutrition. It is realized, of course, that such education can only progress slowly. The subject, however, will undoubtedly be much more keenly grasped by the objective teaching of the lunch room than in any other way. The enterprise is being financed by the employees themselves and the city is put to no expense in its maintenance.

At the opening of this lunch room on Monday, May 10, there were present the acting Mayor, Hon. George McAneny, Borough President Marcus M. Marks, Professor Graham Lusk and other distinguished guests.

The following specimen lunches furnishing balanced ration are taken from the unique menu.

LOW COST.

BALANCED RATION.

	Price.	*Quantity.*	*Calories.*	*Protein*
	Cents.			*gms.*
Cream of asparagus soup...	5	½ pint	230	7.0
Salade a la Santé.....	8	Av. helping	370	2.0
Glass of milk.....	4	7 oz.	160	7.0
Apple pie.....	5	⅛ pie	360	4.0 or
With cheese.....		1 cu in.	390	8.0
Whole wheat bread.....		2 slices	140	5.5
*Butter.....		½ oz.	120	—
	22		1320 or 1410	25.5 or 33.5

HIGH COST.
BALANCED RATION.

	Price. Cents.	Quantity.	Calories.	Protein gms.
Cream of asparagus soup	5	½ pint	230	7.0
Roast beef	20	4 oz. lean	140	30.0 or
with		4 oz. fat	460	27.0
Mashed potatoes, creamed		Av. helping	150	4.0
String beans	5	2 h. tbsp.	10	.5
Salade a la Santé	8	Av. helping	370	2.0
Apple pie	5	¼ pie	300	4.0
Black coffee	3	1 cup	——	——
Sugar		2 sqs.	60	——
Whole wheat bread		2 slices	140	5.5
*Butter		½ oz.	120	——
	—		——	——
	46		1520 or	53.0 or
			1840	50.0

*Butter made from pasteurized milk.

✱

Plague, a National Menace.—A most admirable article appears in No. 20 of the Public Health Reports for the current year—in which Assistant Surgeon-General W. C. Rucker maps out the present geographical distribution of plague, points out the routes over which the country may expect plague and applies logically the knowledge gained in the recent experience at New Orleans and other American ports.

There are four lines of defense according to the author:

1. Marine quarantine and disinfection of ships.

2. The prevention of the embarkation and disembarkation of rodents at wharves.

3. The immunization of human beings against plague.

4. Rat proofing the environment in which man works and lives.

The first three defenses are either impracticable or unreliable—and the conclusion is reached that the last is more feasible and less expensive than is commonly supposed.

✱

Prevalence of Syphilis.—That practically 10 per cent. of the entire adult population of New York City would give a positive Wasserman reaction is the conclusion reached by Dr. Horace Greeley of the New York City Health Department in a study on "Syphilis as a Public Health Menace." in the March monthly *Bulletin*.

His estimate is based (1) on the recorded Wasserman tests in the City Serological Laboratory—which have increased amazingly during the last few years, due to the fact that the number of physicians using the laboratory for diagnosis—and (2) on tests made at various penal institutions and on applicants for license to peddle from push carts.

He mentions the notorious inaccuracy of the recorded mortality rates from syphilis, and cites the fact that many deaths from this disease are recorded under such designations as arteriosclerosis, aneurism, chronic heart disease, chronic liver disease, chronic kidney disease, locomotor ataxia and paresis.

"It would be more in accordance with the facts"—he thinks, "to regard syphilitic infection as responsible for one point in our present death-rate of 14."

Whether one accepts Doctor Greeley's conclusions as true or not, the table which follows is worthy of notice:

NEW YORK SEROLOGICAL LABORATORY
Positive Wasserman Tests.

1912 (May to Dec. 31)	1,547
1913	7,602
1914	13,870

✱

Favors Flexner Serum.—A short note in the May number of *Public Health*—the official organ of the Society of Medical Officers of Health, London—tells of the relative efficacy of the various anti-meningococcic sera, obtainable in England. The article gives statistics which decidedly favor that put out by the New York City Board of Health and known as the Flexner and Joblin serum.

Of the five preparations listed, the American made product gave apparently very superior results and the author concludes "that in all cases of cerebro-spinal fever an anti-meningococcic serum should be used, also that the anti-serum of Flexner and Joblin should receive an adequate trial."

✱

Patrons as Inspectors.—The central idea of a note from the Cincinnati *Weekly Report* for May 1, is worthy of wide advertisement.

"During last week the department had its attention directed to conditions in a number of bakeshops, which illustrate the necessity for continuous inspection of this industry.

"No bakeshop inspections have been made for a period of three months, practically the entire sanitary force having been engaged in sanitary surveys of newly annexed territory for the pur-

pose of ordering sewer connections, the installation of inside closets and the elimination of outside vaults.

"The lack of bakeshop inspection was noticeable on reinspection of some of these places and conditions found which, if not speedily remedied, will result in owners being cited to appear before the Board of Health.

"One man was found mixing dough with dirty hands and arms and was compelled to scrub himself thoroughly before being allowed to proceed with his work.

"Patrons of bakeshops can become an irresistible force for cleanliness in these places and of the employees by making personal inspections.

"Clean shops employing clean methods and clean employees will welcome such inspection, while dirty ones will resent it."

✱

Personal Hygiene.—That health departments are more and more entering the field of personal hygiene is evident. It is encouraging as well as novel to read in the New Haven (Conn.) *Health Bulletin* the following article on a subject which is very distinctly in the domain of personal hygiene—that undeveloped branch of health conservation.

"As summer approaches, the days are likely to be warm and the nights cold and the air may vary much in temperature from day to day. While in the sun it may be warm, in drafts it is more than likely to be chilly. As most people are still wearing the same clothes as in winter, slight exertion produces an uncomfortable heat and often profuse perspiration, and if the exertion is continued, the outer garments are probably removed. Under these conditions one does not realize that the air is cool or that he may be in a chilly draft and when he stops he neglects to protect himself by proper covers. Again, at this time of the year, the ground is often damp and always cold. At leisure moments, especially if the sun is warm and enervating, one is apt to sit or lie upon the ground. On warm days the heavy clothing of winter is uncomfortable and sometimes annoying and people are prone to forget the chilly nights and the sudden changes of temperature from day to day and hasten to change their thick underclothes for those of a much lighter and cooler weight.

"We wish to call attention to the prevalence of colds during the early spring months. Authorities profess to believe that drafts and sudden changes of temperature do not produce colds, but persons to catch cold must be exposed to some of the specific bacteria. Yet they admit that these conditions are predisposing causes and as predisposing causes they are dangerous. We also call attention to the impropriety of changing thick underclothing for light, until the temperature has become settled. Even if heavy clothes next to the skin are annoying, we believe a light weight should not be adopted until near the first of June. We advise against drafts, especially when overheated, sitting or lying upon the ground, or wearing thin underclothing until the likelihood of hot days and cold nights and sudden changes is passed.

"Common colds are never fatal, but their complications or after effects may be very serious. It is of course impossible to estimate the extent of the danger done by colds, but if the theory that colds are contagious is correct, and the complications are many, it is not improbable that the indirect damage to human life is very great. It is therefore our duty to the public as well as to ourselves to protect ourselves from all predisposing causes."

✱

Typhoid Vaccination Campaigns.—North Carolina has the highest typhoid death-rate of any state in the Union according to Dr. W. A. Evans. Its rate is 57.4 per 100,000. However, improvement may be expected soon for, as a result of the active work the State Board of Health, a vigorous anti-typhoid campaign will soon begin in five counties of that state.

"The first five counties in the state to hold coöperative anti-typhoid campaigns with the State Board of Health have just been selected. They are Wake, Northhampton, Cumberland, Henderson and Buncombe. These were the first counties to volunteer active, vigorous cooperation in the matter. Wake County heads the list with an appropriation of $500; Northhampton is second with $400; Cumberland third with $350; Buncombe and Henderson follow with $300 each. This money will be used to pay in part the salaries and traveling expenses of the physicians in charge. The State Board of Health will furnish free anti-typhoid vaccine, literature, placards, posters, and a traveling anti-typhoid exhibit, together with exhibit material on flies, and other public health sub-

jects. These campaigns will start in all five counties on June 21.

"It is expected, from the results obtained in previous years, that 5,000 people or more in each of these counties will avail themselves of this free opportunity to protect themselves against typhoid. This in turn will greatly reduce the typhoid rate in these counties."—*News Bulletin.*

✱

Administration of Child Welfare Work.—In a report recently submitted to the town council of Sunderland, England, Dr. H. Renney outlines the work done there to reduce infant mortality. The work was begun in 1904 and for the five years preceding the average infantile mortality was 165 per one thousand births, for the five years following it was 138 and for the last five years, 133. At three different centers "Mother's Welcomes" were established where much educational work was accomplished in regard to infant management and feeding. Health visitors undertook the supervision of midwives, the instruction of expectant mothers, and the visitation of infants during the first year of life. Attention is drawn to the fact that in this work something should be done for the children between the ages of one and five years. The senior health visitor in this work acts as superintendent of midwives for the bureau giving lectures to them in the evenings. Besides this she makes 1,800 visits per year; each of the other five health visitors makes 4,600, or 16 visits per working day. This scheme provides for the division of the bureau into six districts with a maternity and health visitor for each; the health visitor is to attend at the center once a week to give practical advice on maternity and infant hygiene, visit the children in her district under five years of age, cases of tuberculosis, measles, whooping-cough, and chicken-pox. The visitation of expectant mothers will be an important part of her duties.—*The Medical Officer*, May 1.

✱

Pennsylvania's Progress.—Dr. Samuel G. Dixon has been reappointed Commissioner of Health of the Commonwealth of Pennsylvania.

This is Doctor Dixon's fourth appointment to this position and within a few days he will have completed ten years of service in this office.

Under his direction the Pennsylvania Department of Health has achieved a high place among the public health organizations in this country and the work which has been accomplished has attracted attention at home and abroad.

At the present time the Department has between three and four thousand employees and its activities reach to every section of the state.

In the campaign against tuberculosis, which ten years ago was the chief cause of death in Pennsylvania, one hundred and fifteen tuberculosis dispensaries have been established and three great state sanatoria have been constructed. In ten years tuberculosis has fallen from first to second place as a cause of death in this state and the rate is steadily declining year by year.

Four thousand deaths and forty thousand illnesses from typhoid fever was the annual toll exacted from Pennsylvania's citizens ten years ago. Today this has been decreased more than 75 per cent. and although in the meantime the population of the state has increased more than a million, the number of deaths from this cause is only one-fourth the former figure.

During the past year the death-rate of 13.9 per thousand inhabitants was the lowest in the history of the state. More than seventy-eight thousand people are alive in Pennsylvania today who would have died had the death-rate of 1906 continued. Of these 78,916 lives, 40,528 have been saved by the reduction of four principal diseases.

Typhoid fever	18,865
Tuberculosis	11,924
Diphtheria	4,648
Whooping-cough	4,091

During these years 1,767,000 babies have been born in Pennsylvania whose births have been recorded, with all the facts concerning them, in the Bureau of Vital Statistics of the Department of Health.

Since its establishment the Pennsylvania Department has served as a model for numerous other states that have desired to profit by the methods which have been here inaugurated.

The General Assembly of Pennsylvania appropriated $4,632,387.00 for public health work in Pennsylvania during the next two years. Of this amount, $2,975,807.00 was for tuberculosis work.

Public Health Notes.

Typhoid Fever in the United States in 1914.—*The Journal of the American Medical Association* publishes, in the issue for April 17, its third annual summary of typhoid fever in the large cities of this country. "It is evident from the data given," says *The Journal*, "that typhoid fever is on the way to become a relatively rare disease in many parts of the United States. There are two main reasons for this: 1. There are now comparatively few large cities in which the public water supply is likely to contain typhoid bacteria in dangerous number either constantly or occasionally. 2. The increase in the practice of pasteurization has resulted in a dimunition in the amount of milk-borne typhoid. With these two great sources of infection largely removed, health officers are in a position to begin a detailed study of less generalized sources. Outbreaks due to carriers and other causes can be much more readily discovered when they are no longer screened by a mass of cases due to water or milk. The really astonishing decrease in typhoid fever since 1910, which amounts to a reduction of about 20,000 cases annually in a population of 23,000,000, is a matter for national congratulation. It is not too much to hope that by 1920 nearly all large American cities will have reduced their typhoid rates to a level fairly comparable with that maintained for some years past in Berlin and London."

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Insurance Experience and Lengthened Life.—Forty-three of the leading insurance companies in the United States and Canada agreed in 1909 to prepare their collective experiences on many different classes of insured such as (1) those engaged in hazardous occupations, (2) those with a family history of consumption, (3) those with a defect in their personal history like syphilis (4) those with intemperate habits, and (5) those who were distinctly overweight or underweight. Statistics were compiled concerning two million lives, showing in what classes mortality was above the average and the approximate number of years by which the average lifetime would be reduced.

The statistics regarding hazardous occupations showed that among locomotive engineers the mortality was 60 per cent. in excess of that experienced among the insured as a whole which is equivalent to five years' reduction in the average lifetime. It is interesting to note in this connection that a "safety first" campaign inaugurated by one of the largest railroads has reduced the number of deaths among employees one-third since its inauguration.

The mortality among working miners in underground metal mines was more than double that among other insured men. This means an average reduction of nine years in their lifetime. As pneumonia and tuberculosis are among the principal causes of death here, personal hygiene may reduce this rate.

A high mortality exists among men engaged in the liquor business. That of saloon keepers is 70 per cent. above the normal, that of men connected with breweries is one-third above the normal.

Among people with a history of syphilis only those showing partial or complete recovery were taken as a rule and yet among these people there was an extra mortality of 80 per cent. causing a decrease of about six years in the average lifetime. These figures correspond with those made by German and Scandinavian companies.

The class of men who admit they had taken alcohol occasionally to excess, but having satisfactory habits showed an extra mortality or 50 per cent. or a reduction of four years in the average life. Men using alcohol more frequently made even a worse showing. Upon this basis a loss of five hundred thousand men by Russia in the present war would be made good in ten years through complete abstinence from alcoholic beverages.

Statistics show that tuberculosis frequently follows an attack of pleurisy. Among men who had a parent die of tuberculosis, mortality was high at the younger ages but normal at the older ages.

Among men forty pounds above the average weight at the age of 45, the lifetime was but four years less than of men of normal weight, diabetes, Bright's disease, heart disease and apoplexy causing a large proportion of the deaths.

These statistics of the Medico-Actuarial Mortality Investigation were compiled with no intent to prove a theory but merely to ascertain the facts. Consequently they are unprejudiced and reliable.—Mr. Arthur Hunter, *Chairman*, Central Bureau Medico-Actuarial Mortality Investigation, in the *Public Health Journal*, May, 1915.

✽

New Training for Women in Health Work.—With the increase in our knowledge of microbiology, sanitation, and hygiene and the growing interest in public and personal health, the nurse's horizon has been greatly extended and the lines of her work have been multiplied. The new trend is to prevent illness rather than to cure it. The bedside attention given by the visiting nurse in the past has not been sufficient to meet the requirements. The want has therefore been felt for a training supplementary to that acquired in the hospital training schools which will socialize the nurse and equip her for the important rôle she should play in the community health campaign.

With this purpose in mind, the Boston Instructive District Nursing Association, together with Simmons College and the School for Social Workers, has organized an eight months' course for graduate nurses. The work at Simmons includes Bacteriology, Biology, and Epidemology of Infectious Diseases, Municipal and Industrial Sanitation, Nutrition, and Food, and Education. The social sciences and preventive nursing are given by lectures, conferences, and by actual contact with the field problems afforded by the excellent facilities of the School for Social Workers and the Nursing Association. The nurse goes out as an educator, able to teach the doctrine of cleanliness and as a coöperator, rather than as an assistant to the physician and the public health officials.

Another unique training inaugurated at Simmons College is that for a scientific secretary. This is a four-year program which aims first of all to give a thorough scientific training and secondly, to give sufficient work in the secretarial department to make an expert stenographer and office assistant. As private medical-secretary she should prove indispensable to the busy practitioner, and to hospitals, being able to handle correspondence, keep the case records and do other office work, besides assisting in making urine, blood, sputum, and other analyses. To the research department in institutions, the scientific secretary's familiarity with scientific terminology and literature will round out her assistant work in the laboratory.

These courses are described in the new Simmons College catalogue and in special bulletins sent out by the Instructive District Nursing Association and the School for Social Workers of Boston.—C. M. H.

✽

Technique of Typhus Disinfection.—"A typhus technique outlined by Doctors Letulle and Bordas that is adapted to the temporary military hospital gives the essentials of treatment. The customary separation of patients into groups on entering such an institution gives opportunity for affording special quarters and special treatment for the typhus patients. These are kept by themselves till cleansed, and there is little risk of cross infection so long as they are not permitted to leave infected quarters save under precautions of cleanliness and dress. The entrants must be disinfected, and on account of the minuteness of the pest this must be thorough, and the admission house must have its special apparatus. On examination it is determined at once whether the patient is carrying parasites.

"A special little group of rooms is necessary for thorough disinfection. The floors are of cement and the walls of impermeable plaster. A barber shop and bathroom are the first essentials, and next a hospital cot on wheels with mattress covered with smooth waterproof stuff. There is an incinerator, for wastes, for none of the creatures are permitted to live a moment, but are cremated on the spot. Then there should be the usual cabinet of disinfected tools and another of towels, together with sets of uniforms for the physicians. These are in a green impermeable cloth. There is a pair of sack pantaloons which enclose the slippers and has no opening save at the waistband, which, however, finds itself at the armpits and is here tightly closed by means of a draw-string. There is next a vest of the same cloth with neck and wrists with drawstrings and a cord girdle at the true waist. Additional precautions may include packings of absorbent cotton at neck and wrist

and a cotton cap. These will protect the assistant from parasites.

"When he takes off his clothing the patient himself drops them into a metallic box and upon them there is poured a quantity of benzine or chloroform, the former the most effective, and the box tightly closed. This then goes into a disinfecting-room, the benzine being fatal to the insect. The patient is then shaved both on face and head and the hair drops upon a paper which goes instantly to the furnace. Next there comes the bath, which is somewhat alkaline and a rinsing with javelle water, after which, in clean clothing, the patient is directed toward the place in the hospital assigned to him. It may be anywhere, for he is no longer dangerous. In case of individuals who cannot bathe, compresses moistened with benzine are placed near them in different positions, the fumes of which will be fatal to the pests. In case there are wounds which will prevent the removal of the hair, the patient goes to an isolation room where a treatment with benzine disposes of the insects, but he is kept there so as to be sure that he is not dangerous.

"One can see from this how the principle of entrance house of a hospital for infections, which has its infected side and its safe side separated by bathrooms and disinfectors, can handle typhus where it is not really indigenous. In the quarantine station of an American port, for example, this may be done, but in a country that like Serbia is infected with the insect to an extent that no one really knows, the problem may be quite different, for the cleansed men who survive might be merely turned back into a general reservoir of infection from which they can protect themselves only by some such means as inoculative prophylaxis. The vaccine of Plotz, which is claimed to be a preventive of typhus, is yet much too new a science for a dependence in a grave situation, but Serbia will surely give an admirable case for its testing. And, meanwhile, American sanitarians will be at work heading a movement for the hygienic uplift of the whole country."—Clinic, *Boston Transcript*, May 12.

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Distribution and Habitat of the Tetanus Bacillus.—*The Journal of Infants' Diseases*, March, 1915, published an article by Willis Noble of the Sheffield Scientific School giving the results of his experiments with horses, cows and guinea pigs in an investigation upon the habitat of the above-mentioned organisms. The results of his work are expressed in the following summary:

"The tetanus bacillus appears in the intestines of many normal animals especially the herbivora, but apparently it seems impossible, with the methods at our disposal, to detect it there unless it is present in relatively large numbers. Experimental evidence shows that the tetanus bacillus may multiply in the intestines of such animals. The intestines, or rather the intestinal contents of certain individual animals, seem to offer especially valuable conditions for the growth of the tetanus bacillus; such animals are 'tetanus carriers' comparable in regard to the distribution of the organism, with typhoid carriers among human beings. The presence of tetanus spores in soils, street dust, fresh vegetables and on clothing and the skin is undoubtedly due to fecal contamination."

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"Live a Little Longer," The Rochester Plan.—In speaking before a meeting of life insurance presidents, Miss M. E. Bingeman outlined the plan of the Rochester, N. Y., Board of Education to improve public health. Two teachers, one doctor and one nurse, were engaged to give lessons bearing directly on health and life conservation. Classes (to membership in which women eighteen years old and over are eligible) are taught in the public school buildings between four and five in the afternoon. Information is given concerning what diseases are preventable, how to avoid them, how the body can be made resistant to disease, how to nurse scientifically, how to reserve, record and report symptoms, and what to do in emergencies. The care of children, preparation of food, and child teaching are also discussed. The course consists of twelve lessons, two a week for six weeks, and is successively given in different localities. It is desirable that a class should include from twenty to fifty people.

Interest in the movement was secured through the coöperation of the Ministerial Association, the Chamber of Commerce, the Woman's Educational and Industrial Union and the Life Underwriters Association. The hearty

coöperation of the insurance companies in circularizing their policyholders was of great value and brought immediate results.

The article sets forth the need of public education in health matters and makes an appeal for a general application to this sort of a plan.—*The Public Health Journal*, April, 1915.

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Glanders in New York City.—During the past five years, 5,803 horses have died from glanders in New York City. This means a money loss of over a million dollars. The disease is caused by the bacillus mallei, discovered by Löffler and Schütz in 1882. It is spread by contact, inhalation, through skin abrasions, by infected harness and food and, perhaps most frequently of all, by means of public drinking trough and blacksmith shops. In diagnosing the disease the New York Department of Health has employed the complement-fixation test, the technic of which is similar to that of the Wasserman reaction. Although man is susceptible to the disease it is impossible to estimate the number of cases of human glanders on account of the difficulty attending diagnosis.—*New York Medical Journal*, April 10.

✱

Use of Iodine in the War Zone.—The following quotation is from a letter by Doctor Hamilton to the *Medical Record* of January 23, 1915:

"The use of iodine seems to be most general just at this time, and the French government furnishes each soldier with a small packet containing an ampule with a small brush. An English pharmacist has improved this by supplying an ampule filled with a strong tincture, the friable stem of which ends in a pledget of gauze or cotton. When the wounded man breaks the terminal stem, the bandage is soaked with the contents, and with this he thoroughly swabs the wound. It is said to be far more efficacious than the simple application of gauze, which is said to favor the retention of an imprisoned bacteria. This is on the theory that in anaërobic wounds the dangerous bacteria of tetanus, gangrene, malignant edema, and other diseases thrive in situations when air is excluded; in fact, after the first application of iodine there is little or no dressing applied. In many cases the wound heals by first intention."

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Typhoid Fever Among the English Troops.—Captain Harry Morel, of the Canadian Army Medical Corps, who is now in charge of the inoculation depot at Tidworth Barracks, England, speaks most highly of the benefits derived from anti-typhoid inoculation. It seems remarkable that the sick rate of the English troops is only three per cent., indeed lower than in some of the home garrisons. This is due largely to the absence of typhoid fever. In the Boer war more men died of typhoid fever than of other diseases combined; this disease caused more deaths than bullets. Nearly all of the soldiers engaged in the present campaign have been inoculated and not a single man protected by inoculation has died of typhoid fever.

"Of the 421 cases of typhoid in the present campaign among British troops, 305 cases were in men who were not inoculated within two years. In the 421 cases there have been 35 deaths. Of these deaths, 34 were men who had not been inoculated within two years. Only one death occurred among patients who were inoculated, and that man had only been inoculated once, instead of the proper number of times—namely, twice.

"From all these favorable reports it is quite likely that inoculation against typhoid fever will be made compulsory in the British as it has been in the United States army since 1910."—*Public Health Journal*, May, 1915.

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Are Unvaccinated Persons a Danger to the Community?—Dr. C. K. Millard, in the March *Journal* of the Royal Sanitary Institute, asserts that although unvaccinated people are in greater personal danger they are not a great source of danger to the community because of the fact that successful prevention of smallpox depends upon prompt recognition and proper isolation and care of the disease. Thus cases among vaccinated people which often escape prompt recognition may tend to spread the disease more than cases among unvaccinated. It cannot be denied, however, that the existence of a large unvaccinated population must add to the

seriousness of an epidemic. Thus a partially vaccinated community is exposed to a peculiar danger.

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Administrative Control of Diphtheria.—The present tendency is for more attention to be paid to the "carrier" as one of the chief factors in spreading this disease. The question naturally arises then, Where may the carriers be best looked for? Recent statistics dealing with a fairly large number of cases show that throat or nose swabs from both home contacts and school contacts reveal three times as many positives among the former as among the latter. Moreover, clinical nasal diphtheria is at times apparently more infectious than the pharyngeal form.

Accordingly, contacts in the home and at school, especially cases of mild sore throat, should be subjected to laboratory examination and a careful examination should be made during convalescence as the infection may persist after weeks of isolation. Graham Smith makes the point that the bacillus is of slower growth in these last mentioned cases and the cultures have to be incubated for a longer period than usual.

Some interesting statistics comparing English towns which have hospital isolation for diphtheria with those which do not has shown that the latter have a lower case rate than the former. This may be explained by the fact that where isolation is practised the usual custom is to disinfect the house after the removal of the patient and then, after a short period of quarantine, to allow the contacts to return to school or to public life, while in the other case all contacts remain in quarantine. This apparent advantage on the part of towns without hospital isolation is offset by their higher case mortality.—*Journal Royal Sanitary Institute*, March, 1915.

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Letter from Servia.—*The New York Medical Journal*, May 15, prints a letter from J. Rudis-Jicinsky which we quote in part:

"Typhus fever or exanthematic typhus came in its acute form, infectious, febrile, and highly contagious. The invasion of this epidemic was sudden, with profound depression of the vital powers of all the patients, especially the prisoners of war, housed together in unclean places, overcrowded, unventilated, and under absolutely insanitary conditions, with a diet to which many were not accustomed. When the mortality in February went up to 80 per cent. at some places, when the physicians and surgeons, exhausted as they were in taking care of thousands of wounded, gave their first offerings upon the altar of humanity—we lost, here and in the vicinity, about eighty-nine of them.—we had to think again, and selected a commission approved by the military authorities and the state, to find means to fight this enemy worse than bullets, grenades, shrapnel and bombs. We found that fear was a bad physician and cleanliness the best medicine.

"The hyperemia of the brain beginning abruptly with a chill, was followed by violent fever, the temperature within a few days reaching 38° to 40° R., according to their thermometers, or, according to ours, 104° to 105° F. The pulse was frequent and bounding, soon becoming small, weak, and rapid. We had to watch the cardiac impulse, the first sound being almost effaced in the majority of cases. Then severe headache followed and delirium, from the fifth to the seventh day. Beside the little wounds produced by the louse, we found usually on the chest of the patient, first, a coarse, red, diffused, measly eruption, with a mottling of the skin later all over the body, except the face, not disappearing on pressure. The face had a deep flush, the pupils were contracted, the eyes injected. We isolated the cases at once, disinfected our wards every day, especially the toilet rooms, covering all the beds with naphthalin and washing the bodies of the patients—all of them.—with petroleum, whitewashed the rooms once a week, looking for absolute hygienic surroundings.

"We cleaned up our place—after one of our pavilions had burned down, the other day—telegraphed home for funds to Mr. J. W. Frothingham of New York, and now purpose to build up a sanitary field hospital or barracks, clean and new for the prisoners; pavilions for contagious diseases had already been erected by our English colleagues. In this way, we hope the typhus will be checked soon, and proper arrangements made to meet the cholera. At present,

the death-rate being 45 per cent., we need funds, the articles named above—shirts, underwear, socks, shoes, slippers, disinfectors, medicine (quinine sulphate, digalen, strychnine, the iodides, iodoform, cocaine, chloroform, ether, morphine, chloral, bromides, etc.) and surgical material (cotton gauze, bandages, ligatures, silk, adhesive plaster, etc.)."

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The Problem of Proper Lighting.—Medical inspection of school children has made us aware of the existence of a large number of abnormal eyes among scholars from the earliest ages and shows us that the proper lighting of a school room is of primary importance. The minimum illumination on desks for ordinary clerical work is 2½ to 3 foot candles. Reflections, the nature of the blackboard, of the chalk used, and the work to be done, is also of importance. Here, as in industrial establishments when artificial illumination is used, it should be even and in sufficient quantity but not of a monotonously uniform brightness. All good lighting should avoid flickerings, unshaded lights in direct vision, glare, excessive contrasts, insufficient illumination, dirty and wrong types of lamps, globes and reflectors and improperly placed sources of light. Even in shop windows care is taken to make the light fall upon the goods and not into the customers' eyes.—*Medical Officer*, April 24.

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Artificial Cultivation of Smallpox Virus.—Dr. Fr. Proescher has shown that the filterable virus of variola as well as that of rabies and of poliomyelitis is visible and may readily be stained by such aniline dyes as methylene azure. He states that he has recently succeeded in cultivating the variola-vaccine virus under anaërobic conditions. The classification of this organism is still in doubt. They are coccus-shaped bodies although their staining reaction resembles that of the protozoa rather more than that of the bacteria. The author concludes that the constant microscopical finding of these organisms in the specific lesions, their peculiar staining properties, the cultivation of a similar organism from the original and the production of typical changes with far distant sub-cultures in susceptible animals leaves no doubt as to the specific nature of the organism which he has succeeded in growing upon artificial media. It remains to be shown, however, whether the artificial cultures of these micro-organisms are able to produce an active immunity or give rise to antitoxic or bactericidal antibodies.—*Interstate Medical Journal*, May, 1915.

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The Mode of Infection in Infantile Paralysis.—The belief that this disease is carried by the stable fly is general and is based wholly upon an imperfect experimental foundation which has now been largely disproved, according to Dr. Simon Flexner. It will be remembered that Dr. M. J. Rosenau announced in 1912 that he had succeeded in transferring experimental poliomyelitis from diseased to healthy monkeys through the medium of the stable fly. This experiment was confirmed soon after by Anderson and Frost but they, as well as many other investigators, have failed to repeat the experiment successfully since that time. It is difficult to explain these early experiments and it is certain that danger of infection from this source is slight.

The fact has since come to light that there are walking or ambulatory cases of poliomyelitis and the author brings evidence to show that the microbic agent of the disease is carried in the nasal and buccal secretions of persons, and communicated by them in such manner as to gain access to the upper respiratory mucous membranes of other persons who acquire the infection and develop the disease. This should not cause undue alarm, for the carriers are not more numerous in this disease than in many other infections of common occurrence.

The virus or microbic agent of epidemic poliomyelitis has been cultivated by Doctor Flexner and Doctor Noguchi. It consists of minute globular bodies capable of being distinctly viewed under a high power of the microscope.—*American Journal of Diseases of Children*, May, 1915.

✱

Aseptic Nursing.—A good lesson in the importance of contact infections is given in a discussion of the methods employed in treating contagious diseases at St. Luke's Hospital, Jacksonville, Florida. The article referred to is written by L. J. Harris and appears in the April *Journal* of the Florida Medical Association.

At St. Luke's Hospital each patient in the contagious pavilion is placed in a cubicle or small room with walls of silicon plaster or glass. Each room is provided with a wash basin without any plug in it and levers operated by the elbows for turning on and off the water. The walls of the room are painted with an enamel finish that they may be easily washed and the doors are always left open. The room is also provided with hooks for the physicians' and nurses' gowns, individual paper toweling and everything necessary for constant use on the patient. In going on duty the nurse changes her dress, cap, apron and bib only, and in going off duty she removes her ward clothing first, washes hands and face and then puts on a uniform that has not been worn in the ward. No disinfectant is used for the hands, a thorough washing is found to be more practical and efficient. When the patient is discharged the linen in his room is sent to the laundry, the mattress and pillows to the steam sterilizers and the nursing articles are sterilized. The walls and furniture are washed with soap and water. Fumigation is never done. The result of thus laying the whole emphasis of danger upon contact infection has been that since 1904 the per cent. of cross infections has been less than 0.1.

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Dairy Scores vs. Bacteria.—"In so far as the quality of milk can be determined by present laboratory methods," concludes James D. Brew in Bulletin No. 398 of the New York Agricultural Experiment Station, "there exists no relationship between the quality of milk and the dairy score on the score cards now in use. Milk of all grades, ranging from the finest quality to the poorest, is produced in barns which would be excluded on account of low scores. All grades of milk are likewise produced in high-scoring barns.

"The real explanation for this lack of relationship between the scores and the bacteria counts cannot be given as yet with absolute certainty. The most apparent reason, as shown by investigations made at this station, is that a large number of the items included on the score card have little or no effect upon the number of bacteria present in the milk. In other words, too great emphasis is placed upon unessential factors in all of the score cards studied, with a consequent lessened emphasis upon the factors which actually do affect the milk.

"Some may contend that these findings encourage the production of milk under filthy conditions. This contention will be raised only by those who hold the idea that low-scoring dairies are necessarily unsanitary and filthy. Such conditions have, however, not been found to hold true in the region studied because low-scoring dairies were found which vied in cleanliness with the most ideal of the high-scoring dairies. On the contrary, however, these facts give decided encouragement to the intelligent dairyman who finds that he can produce high-grade milk by the simple observation of the few essential factors of cleanliness and care. This places him in a position to secure a greater profit from his business while at the same time he has the moral satisfaction of knowing that he is selling a high-grade article. Where the present score cards are used, all dairies, in order to get credit for Grade A milk, are forced to an additional expense and consequently to an increased cost of production. At the same time a compliance with the score-card requirements carries with it no guarantee that the quantity of milk will be improved or rendered more safe from the standpoint of public health.

"The fact that high-grade milk can be produced with simple equipment, likewise gives encouragement to the consumer who is as much interested in keeping down the cost of producing high-grade milk as is the producer.

"None of the results secured in this investigation can be so construed as to disprove the value of dairy score cards, but they do show that present score cards cannot be satisfactorily used as a means of grading milk according to quality."

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Smoke and Health.—While the soot from coal smoke has been found to have germicidal properties, the general effect of an undue amount of smoke in the atmosphere is harmful. These are the conclusions of Dr. W. L. Holman of the Pittsburgh Pathological Laboratories in an article giving an account of some studies along this line in the May number of the *Journal of the Outdoor Life*.

Coal smoke is made up of particles of incompletely burned coal and a number of gases arising

from the combustion, which indicates a waste, since properly stoked fires do not smoke. These sooty particles floating in the air become the centers of tiny envelopes of water, formed by the condensation of the aqueous vapor of the atmosphere when the temperature falls. The more numerous the particles in the air under such conditions, the denser will be the fog or mist which they form, and when they become too heavy they fall as rain. While smoke doesn't afford the only source of supply for the building of fogs, it is a great accelerator, as is evidenced by conditions in London or Pittsburgh.

"Now fog has two bad effects on health," says Doctor Holman. "First, it prevents the air of our cities from becoming properly mixed with the fresh outside air; and second, it holds irritating gases, which also come from the burning coal, within the breathing zone, and it makes the temperature higher in summer by interfering with the radiation of heat from our streets and buildings, and lower in winter by cutting off the sun's rays. All these conditions have very marked effects on health. Breathing impure air lowers our general resistance, and the irritating gases, by directly acting on the air passages, make more easy the entrance of bacteria. Acute infections of the nose, throat and lungs are more common in smoky cities than elsewhere and increase during periods of foggy weather.

"The second bad effect of fog comes from interference with the sun's rays. Sunlight is our best and most constant germicide. Smoke clouds and fogs allow only the red rays to pass through, as you see it in the familiar red sun. They prevent the passage of the blue and violet rays, and it is these rays that are most active in destroying bacteria. Thus we magnify the chances of infection by lowering our resistance through the breathing of impure and irritating air, and then we interfere with the natural disinfecting action of the sunlight."

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B. Coli in Pasteurized Milk.—The fact that the presence of bacillus coli or any other non-sporulating gas producer in pasteurized milk has usually been taken to indicate improper pasteurization, or subsequent contamination of the milk, led Dr. L. P. Shippen to make tests upon the thermal death point of 31 strains of these organisms which had been recovered from pasteurized milk and 13 strains recovered from unpasteurized milk. From his careful experiments conducted at the Laboratory of Bacteriology and Hygiene at Johns Hopkins University the author draws the following conclusions: (1) as observed by DeGralf and De Jong certain strains of B. coli are not killed by a temperature exceeding that commonly used in pasteurization. (2) the thermal death point of these and similar organisms is not a constant quantity but varies in the different strains of the same bacterium. In the case of B. coli communior this variation was found to be as great as 13 degrees. (3) The presence of B. coli in pasteurized milk cannot be taken as an index of its improper pasteurization for subsequent contamination.—*Journal of the American Medical Association*, May 17, 1915.

Industrial Hygiene and Sanitation.

Industrial Disease Compensation.—The following opinion of the Massachusetts Supreme Court, published in *Public Health Report* for May 14, 1915, is of noteworthy significance:

In re Brightman. In re Aetna Life Insurance Co. 107 N. E. Rep., 527. Dec. 31, 1914.

"Deceased was employed as a cook on a lighter. He suffered from heart disease, which, aggravated by excitement when the lighter sank and by his exertions in saving his personal effects, caused his death. The court held that his death was caused by an injury within the meaning of the Massachusetts workmen's compensation act.

"Rugg, C. J.: * * *

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"The deceased employee was a cook upon a lighter, where his employment required him to live and be a large part of the time. The craft began to sink and he then made several trips to and from the deck in an attempt to save some of his clothes and a surveying instrument. With these he hastened to the dock, where he died soon after. He had suffered from valvular disease of the heart, and his exertions in the effort to save his belongings and the excitement incident to the loss of the vessel so aggravated the heart weakness as to cause his death. The perils of the sea were risks arising out of and in the course of the employment of the deceased. The sinking of the boat obviously was one of these perils. It is impossible to say as matter of law that it is not one of the instincts of our common humanity to try to save from a sinking vessel all of one's possessions that reasonably can be secured. The deceased perhaps exerted himself too much for this purpose, although it would be difficult on the evidence to determine to how great an extent the fatal result was due to that cause rather than to the excitement of the occasion. Under these circumstances the calm and wisdom of quiet and safety cannot be expected. Much must be excused to the surrounding commotion. The deceased did not abandon the service of his employer and embark on a venture of his own when he tried to save his clothing. It was an implied term of such service as this that the employee might use reasonable effort to this end in an exigency like that which arose. This is not an instance where the discipline of a ship was violated or a higher duty neglected. It was in the course of his employment to live upon the lighter. Whatever it was reasonable for anyone to do leaving a sinking vessel, which was his temporary home, was within the scope of his employment. The standard to be applied is not that which now, in the light of all that has happened, is seen to have been directly within the line of labor helpful to the master, but that which the ordinary man required to act in such an emergency might do while actuated with a purpose to do his duty.

"The cases relied upon by the insurer, collected in 25 H. L. R. 420, 421, are distinguishable. They are all instances of conduct by the employee quite outside the scope of the employment, resting upon intelligent abandonment for the moment of duty to the employer. In the case at bar there may be found to be apparent to the rational mind a causal connection between the employment and the thing done by the employee at the time of the sinking of the lighter. McNichol's Case, 215 Mass. 497, 102 N. E., 697.

"Acceleration of previously existing heart disease to a mortal end sooner than otherwise it would have come is an injury within the meaning of the Workmen's Compensation Act. *Wiemert* v. *Boston Elev. Ry.* 216 Mass., 598, 104 N. E., 360; *Clover Clayton & Co. (Ltd.)* v. *Hughes* [1910], A. C. 242. The inference that the death of the employee arose out of and in the course of his employment was warranted by the evidence."

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Safety First in Treating Hand Infections.—The treatment of hand infections, in order to give the best results, must include:

1. Proper preventive measures, especially the prophylactic use of tincture of iodine and the early reporting of all minor injuries.

2. The treatment of all hand infections as a serious surgical condition from their inception and the adoption of radical hospital treatment early.

3. The proper and early diagnosis of the type and nature of infection and the exact location of the pus.

4. A proper incision of the abscess, in order to establish adequate drainage and yet not spread the infection to other spaces.

In talking with a number of surgeons and managers of claim departments in large companies, they all agree that:

Hand infections cause a high percentage of their disability.

Over 50 per cent. of their hand deformities are the result of infected injuries.

A great many amputations result from neglected infected fingers.

Hand infections are usually the result of minor injuries, such as pin pricks, nail wounds, splinters, scratches, small cuts, cracked hands, blisters, contusions and abrasions. Such minor cases, as a rule, do not report to the doctor until the infection has developed.

Severe hand injuries, such as extensive lacerations or severe crushing injuries, are seldom infected. The nature of these injuries is such that the patients are forced to consult the doctor at once.

The early treatment of all accidents, no matter how slight, would reduce infections to a marked degree.

First Aid Treatment.

"First aid" should be given in a majority of cases by a physician who is especially trained in dressing a fresh injury so as to prevent further complications and to give the quickest recovery possible.

The next best "first aid" worker is a well-trained surgical nurse, but even then the injured employee should be sent to the doctor as early as possible. The chief point to be emphasized here is the early reporting for this first surgical dressing.

In the absence of a doctor or a nurse, a trusted employee should be furnished with a simple emergency kit and given careful instructions in its use.

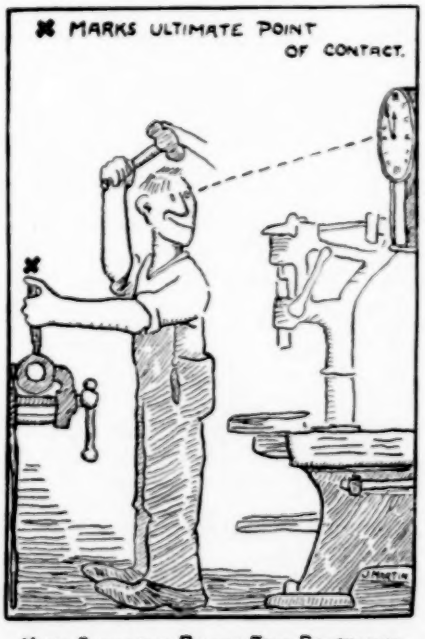
The emergency man should be positively warned against washing a fresh wound with soap and water or with any antiseptic, especially hydrogen peroxide. This washing of a wound usually rubs the dirt and germs deeper into the tissues and makes the infections more prone to occur. Hydrogen peroxide, by its foaming expansive power, likewise carries dirt deeper into the wound without killing the germs of infection.

Iodine is the best emergency antiseptic.

It would be a great saving to any industry to absolutely forbid fellow employees from rendering "first aid" to one another, especially in the minor accidents. The extraction of splinters from hands or other parts of the body, removal of foreign particles from the eye, especially emery, and the care of small cuts, nail wounds, etc., by fellow employees, is a very common practice. These kindly efforts are so frequently followed by serious complications necessitating prolonged disability, that it would be much safer and cheaper to send all such minor accident cases to a physician for proper first care, and usually one or two dressings would be necessary, with practically no loss of time from work.

Safety First for the Injured.

Prevention of infection is one of the most fertile fields of endeavor open to the company



MOST ACCIDENTS RESULT FROM BONEHEADED CARELESSNESS

surgeon. It is the safety first movement for the injured. A study of the etiology of every infection will show the majority are due to preventable minor accidents, and by a removal of these causes a great reduction in infections will ensue. Thus, in one large concern, the tin lining of bins which had become loosened, was the cause of injuries which became infected. In every case a notice was sent to the manager, pointing out the preventable nature of this accident, and in one year the injuries from this source were reduced from 75 to 10. The same procedure was followed in the case of broken baskets, exposed ends of wire, nails on the floor, pins in packages, etc., all resulting in a decrease in minor accidents and therefore in infections.

The use of gloves or other protection to the hands is of great value in certain occupations tending to blister or to crack the hands.—*Wells, Fargo Messenger*—Reprinted from the *Manufacturers' News.*

✤

Principles and Methods of Industrial Control.—An industry is responsible for the conditions existing in its establishments.

It is the duty of an industry to take care of and to improve the sanitary conditions of its factories and workshops.

Good sanitary conditions of industrial establishments are a debt which the manufacturers in an industry owe to the public and to the workers.

Efficient and permanent improvement of industrial conditions can be brought about only by industrial self control, by a coöperation of manufacturers, workers and the consumer.

Humane and decent industrial conditions mean good sanitary conditions of the shops, living wages and hours of labor that do not cause over-fatigue.

No detection of sanitary crimes, but prevention.

No threats, fines or penalties, but friendly counsel, agitation and education.—*Bulletin of the Joint Board of Sanitary Control*, New York City.

✤

Motion Pictures in Fire Safety Work.—An article by J. E. Latta in the May number of *Safety Engineering* tells of a new and valuable use for the "movies." A series of films have been prepared in the Underwriters Laboratories in Chicago, showing in detail many of the experiments made there with the object of preventing fires. The observer is carried in the pictures to every important part of the big Chicago testing station. The pictures are noteworthy because of their completeness—and should be of service in campaigns for building code reforms, fire prevention and the like. They are filed in the office of the secretary of the National Fire Protection Association and at the Stubbs Lecture Bureau in Chicago.

✤

Headache—Enemy of Efficiency.—Headache as an enemy of health and efficiency is admirably treated in a recent number of "For You"—the Ford Health Bulletin.

The wisdom and the value of the following advice to employees is apparent at first reading—and this relatively new departure is to be commended.

"During the first three weeks of March there were 544 cases of headaches reported to the Hospital. Possibly there were as many more not reported. The point is, that people suffering from headache are not as efficient as others.

"Lots of men and women think—'Oh, it's just a headache. It will pass.' Then they let it go at that and continue to suffer. Of course they will pass. So will typhoid fever or any other disease.

"The thing for you to do is to get good advice from the doctor about what is causing your headaches. Then go after the remedy. Don't have any guess work about it. Any headache is important enough to be the subject of special study and advice. The treatment that will cure somebody else's headache probably will not do you any good. Maybe you need something entirely different. Be sure you get the right advice and then follow it.

"Some headaches result from heart or nerve strains. The blood gets choked up inside the head and can't get out fast enough. Most headaches come from improper foods, drinks and eating too rapidly. Still others come from poor eyesight.

"Don't expect 'dope' to cure your headache. Nine-tenths of the patent medicines and powders you see advertised contain powerful drugs, and if you use them, you are taking a chance of

getting the 'dope' habit. *Do you want to be a drug fiend?* Then get advice from the doctor and do as he says."

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The Medical Report of an Industrial Plant.—The Colorado Fuel and Iron Company has just issued an interesting and completely illustrated report from the Medical Sociological Departments. The medical report shows a total of 94,810 cases treated during 1914 as compared with 101,375 cases treated during 1913. The sick and injured at the mines are sent to the Company's hospital. There are one-tenth as many cases of erysipelas, and one-fourth as many cases of typhoid fever among employees as ten years ago. All employees are vaccinated against smallpox and many against typhoid fever. They are requested to undergo frequent physical examinations and are given practical instructions as to how they may avoid accidents. Twenty thousand dollars has been spent in safety work mostly during the last three years in equipping the plant and machinery with proper railings and guards. A pamphlet dealing with some phase of personal hygiene of prevention of disease is sent out to workmen each month. The report gives a good outline of the actual operation of this sort of a department in an industrial plant. The record was prepared by Dr. R. W. Corwin, Chief Surgeon, Pueblo, Colo.

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The Results of Scientific Ventilation.—The new Federal Building for the Bureau of Engraving and Printing has recently established a highly scientific and efficient ventilating system which, according to Doctor Laveson, the medical officer, has resulted in an improvement of the quality and quantity of the printing and a marked impression in the health and vigor of the employees. In 1913 two thousand employees applied for treatment of headache. Since moving into the new building there have been one-half as many cases.—*The New York Medical Journal*, May 8.

Personal Notes.

Dr. Allen W. Freeman, Richmond, Va., has resigned as assistant state health commissioner to become epidemiologist for the U. S. Public Health Service at Washington.

*

Mr. Charles Saville, late of the firm of Messrs. Hering and Gregory of New York City, has recently been elected Director of Sanitation to the new Board of Health of Dallas, Texas.

*

New Health Commissioner at Chicago.—Dr. J. D. Robertson is now health commissioner of the City of Chicago, displacing former commissioner G. B. Young, whose excellent work is known throughout the country.

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The following were elected to membership in the American Public Health Association on May 17, 1915:

Mrs. Elizabeth M. Finnigan, Lyons, N. Y.
Morris Maslon, M. D., Glen Falls, N. Y.
Murray Bartlett, M. D., Manila, P. I.
Paul Louis Feiss, Cleveland, Ohio.
Frank Bachmann, Bacteriologist, Chicago, Ill.
Paul Bellows Brooks, M. D., Norwich, N. Y.
Daniel Warren Poor, M. D., Orange, N. J.
Edward, Mayo Tolman, Hagerstown, Md.
Edward Jenner Wood, M. D., Wilmington, N. C.
Mrs. Clara C. Gunn, Watertown, Mass.
Leonora H. Christian, Minneapolis, Minn.
David H. Bergey, M. D., Philadelphia, Pa.
Gustave R. Tuska, New York.
Margaret Barclay Wilson, New York.
Samuel Archer Munford, Ithaca, N. Y.
Lunsford, D. Fricks, Surgeon, Victor, Montana.
John T. Booth, M. D., Richmond, Va.
Dr. Wm. F. Lippett, San Juan, P. R.
Boney W. Page, M. D., Lumbertown, N. C.
State Board of Health, Lansing, Mich.
S. Josephine Baker, M. D., New York.
Harold Gilbert McGee, West Lansing, Mich.
Chas. Wm. Naulty, Jr., M. D., Perth Amboy, N. J.
Aime Cousineau, Montreal, Canada.